

2.0 ALTERNATIVES

This section describes all of the alternatives considered, including the No-Build Alternative, rail operational improvements, in-town grade separations of the railroad at specific locations in Tupelo, and proposed rail alignment alternatives. The No-Build, the operational improvements, and the in-town alternatives would permit the rail traffic to increase speed through Tupelo while potentially reducing auto traffic delay and improve safety. The proposed rail relocation alternatives would result in a new rail line for either a portion or all of the BNSF and KCS traffic around downtown Tupelo with a specific intention to remove the traffic conflict at Crosstown. Each alternative was evaluated based on its ability to satisfy the project's Purpose and Need.

2.1 NO-BUILD ALTERNATIVE (ALTERNATIVE A)

The No-Build Alternative would not construct any improvements to either the existing roadway network or the existing rail facilities, beyond any projects that are currently planned or programmed. The existing alignments for the BNSF main line and KCS rail line would remain in their existing locations, without any rail or automobile improvements. The existing BNSF-KCS interchange yard would also remain. The No-Build Alternative does not satisfy the project's Purpose and Need, but is required to be brought forward for further analysis and evaluation under NEPA (and 40 CFR §§ 1502.14(d) & 1508.25(b)).

2.2 FEASIBILITY ALTERNATIVES

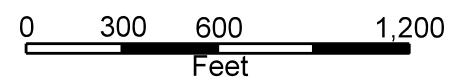
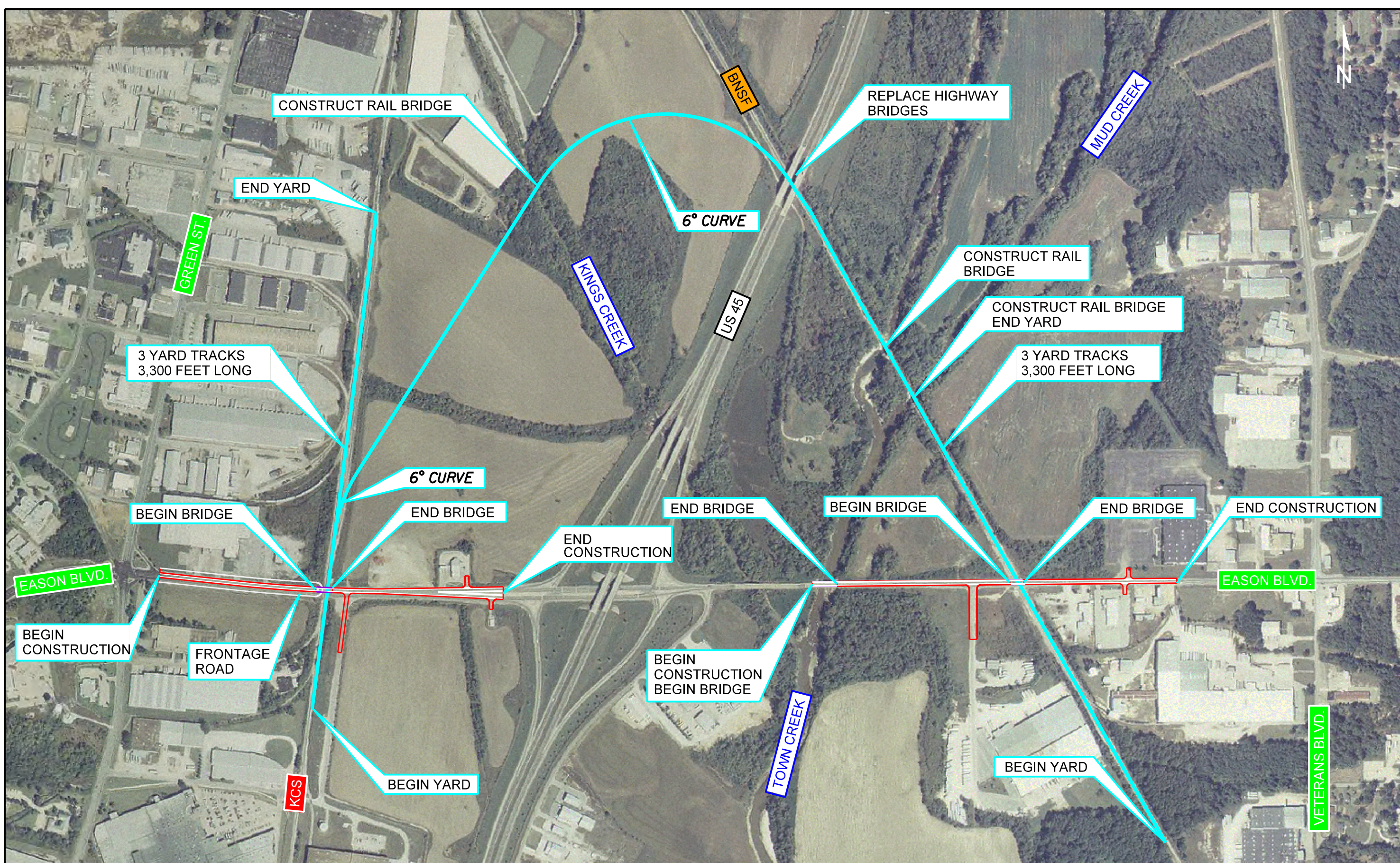
The following alternatives were identified and analyzed as part of the *Phase 1 – Feasibility Analysis* (HDR, May 2006). In June 2006, the FRA approved the document, and the Scoping Phase was initiated.

2.2.1 Operational Improvements

The amount of rail traffic through Tupelo contributes directly to the auto traffic delay and safety concerns at the at-grade crossing locations. A portion of the delay occurring in-town is due to the exchange of rail cars between BNSF and KCS. This exchange of cargo, while serving the needs of the community, blocks the major north-south and east-west arterial roadways. The BNSF and KCS interchange is located approximately 3,600 feet east of Crosstown.

The proposed operational improvement to address the exchange of rail cars between BNSF and KCS is to move the BNSF-KCS interchange to the southeast along the BNSF main line, shown on **Figure 2-1**. The interchange would be located south of the Pvt. John Allen National Fish Hatchery and north of US 45. Three rail storage tracks, turnouts and electric lock-out switches would be constructed along both the BNSF main line and KCS rail line for the exchange of rail cars. Roadway improvements would be the grade separation of Eason Boulevard over both the BNSF and KCS crossings, which would also reduce auto traffic delay and remove potential rail and vehicular conflicts. The existing highway overpass for US 45 would also require reconstruction to facilitate the additional storage track.

Figure 2-1 Operational Improvement



Tupelo Railroad Relocation Planning and Environmental Study

Operational Improvement

Figure
2-1



2.2.2 In-town Alternative Scenarios

Improvements along the existing BNSF line in Tupelo were analyzed for upgrades and/or improvements to both the railroad and roadways. The Crosstown intersection was identified as a primary location for improvements. Two scenarios were analyzed for improvements in downtown Tupelo at the Crosstown intersection. Scenario 1 is to elevate the roadway intersection over the BNSF line. Scenario 2 is to elevate the BNSF main line over the existing roadway intersection.

2.2.2.1 Scenario 1

Scenario 1 consists of elevating the Crosstown intersection above the existing BNSF line. Although the highway overpass could be contained within the existing right-of-way, there would be significant impacts to the ability to maintain traffic volumes during construction as well as impacts to the access to adjacent properties.

Upgrading the railroad switch for the BNSF and KCS interchange with an electric switch lock system would improve the safe operation of switching operations in the rail yard and allow an increase in the speed of trains approaching the interchange. The recommended roadway improvements, shown on **Figure 2-2**, to improve the functional speed of the BNSF main line in its current alignment through Tupelo are:

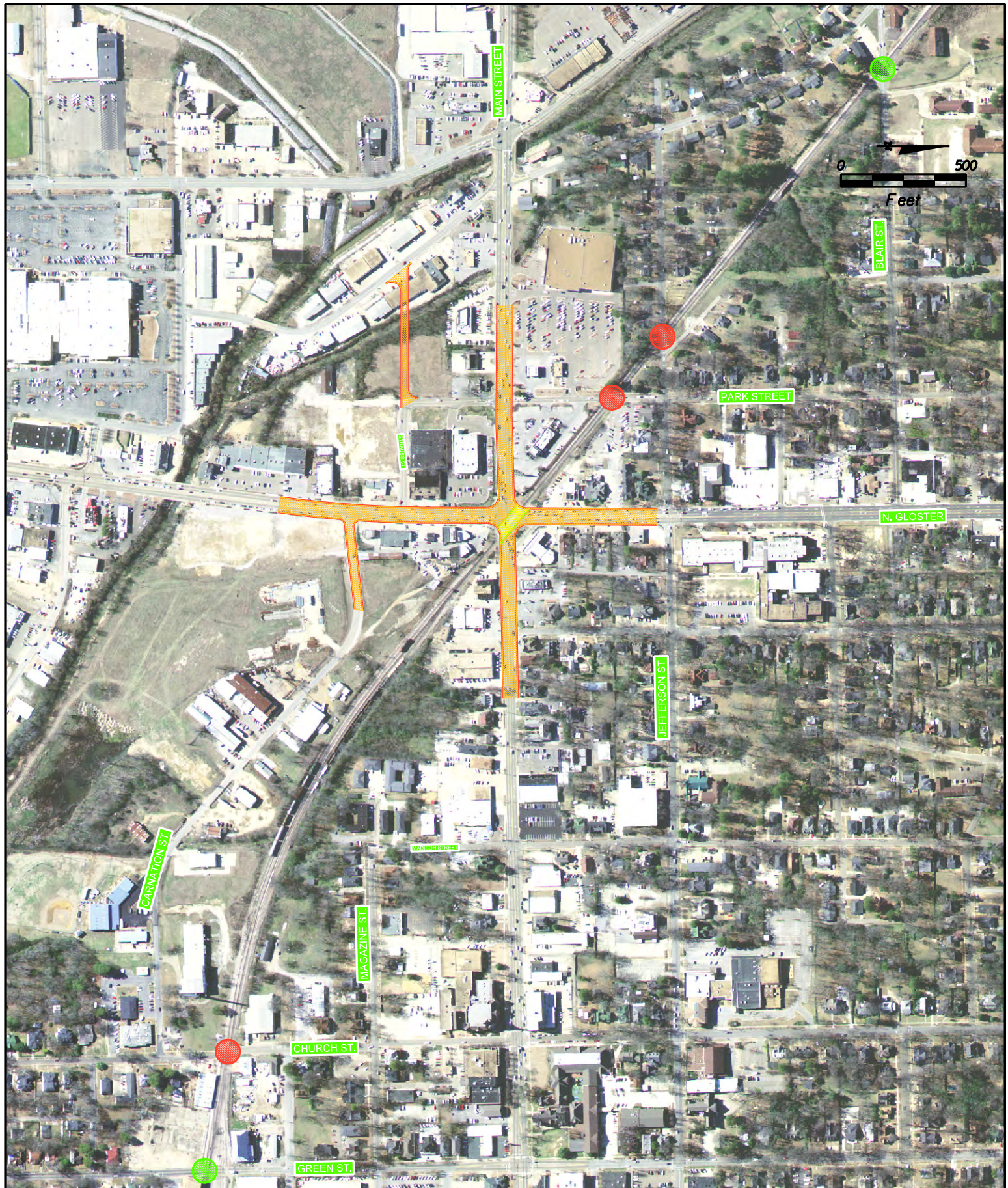
- Full closure of at-grade crossings at Jefferson Street, Park Street, and Church Street;
- Installation of warning gates with flashers at Spring Street, Green Street and Blair Street; and
- Construction of a grade separation at the Crosstown intersection by building a highway bridge structure over the existing railroad.

2.2.2.2 Scenario 2

Scenario 2 consists of constructing a railroad bridge over the Crosstown intersection. The proposed improvements would be constructed to the north of the existing track and would require right-of-way acquisition to allow for uninterrupted train service.

An elevated railroad bed, bridge and retaining walls would be constructed across the Crosstown intersection. The limits of the improvements would be between Jackson Street and 1,000 feet east of the KCS crossing. The switch point for access to the rail yard would need to be relocated to the east near the Spring Street crossing. The recommended roadway improvements, shown on **Figure 2-3**, to improve the functional speed of the BNSF main line in its current alignment through Tupelo are:

- Full closure of the at-grade crossing at Church Street;
- Installation of warning gates with flashers at Spring Street and Green Street; and

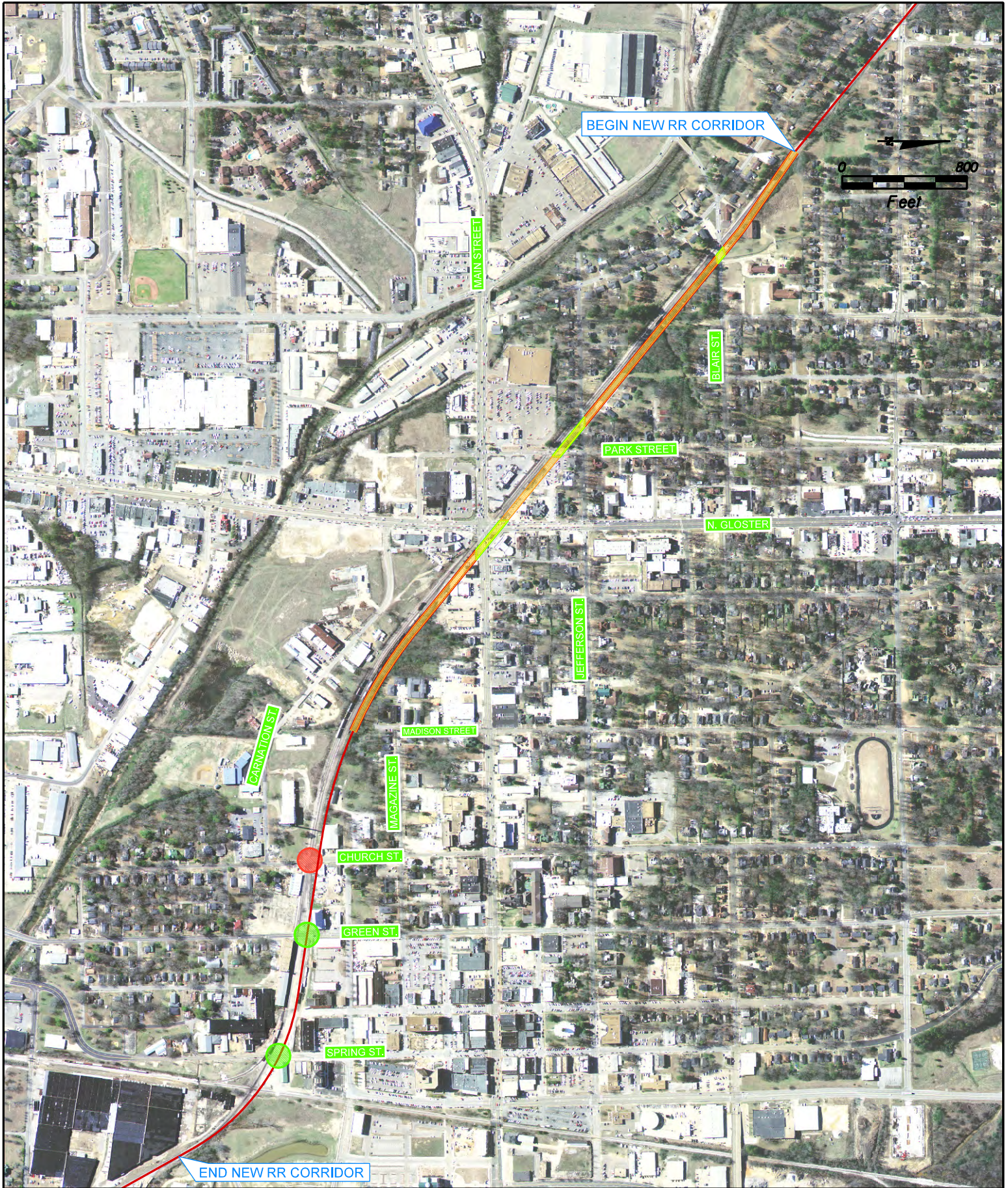


LEGEND	
	PROPOSED BRIDGE
	UPGRADED RR CROSSING
	RR CROSSING CLOSED
	PROPOSED ROADWAY

Tupelo Railroad Relocation Planning and Environmental Study

In-Town
Alternative
Scenario 1

Figure
2-2



LEGEND	
PROPOSED RR BRIDGE	
UPGRADED RR CROSSING	
RR CROSSING CLOSED	
PROPOSED RETAINING WALL	

Tupelo Railroad Relocation Planning and Environmental Study

In-Town
Alternative
Scenario 2

Figure
2-3



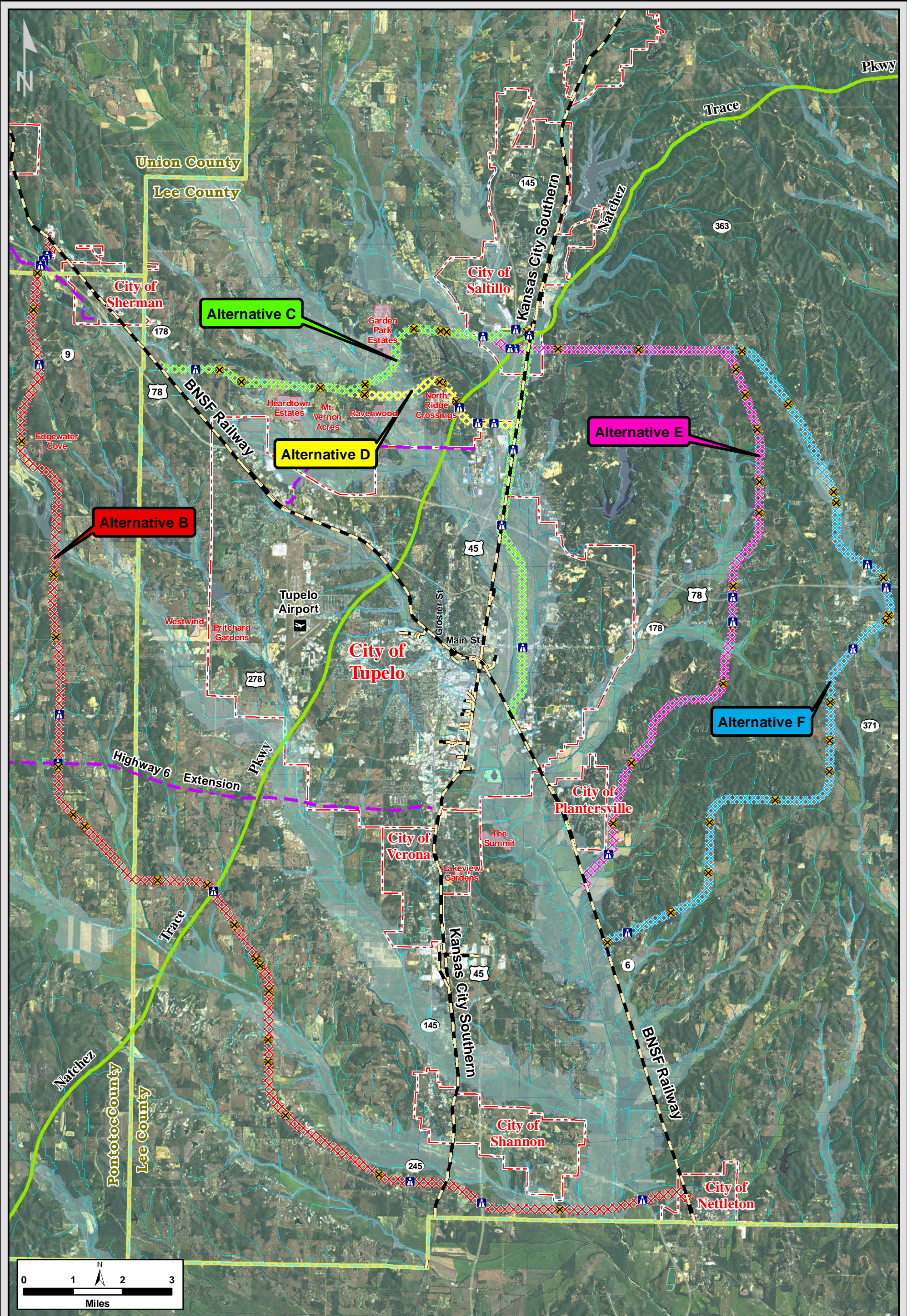
- Construction of a railroad overpass over the existing at-grade crossings at Blair Street, Jefferson Street, Park Street, and Crosstown.


2.2.3 Alternative B











Alternative B, shown on **Figure 2-4**, which would bypass Tupelo to the west, is approximately 29.7 miles in length and would begin just north of the Town of Sherman. The alignment turns south and enters Pontotoc County and continues south following Lilly Creek then Coonewah Creek then turns east into Lee County. The alignment curves southeast crossing the Natchez Trace Parkway and Chiwapa Creek, then turns east to follow the Chiwapa Creek floodplain. The alignment crosses the KCS line at approximately MP 268.1, south of Shannon, Mississippi, and an interchange yard would be constructed near this location. The route would cross Chiwapa Creek again and connect to the common southern point on the BNSF main line just north of the town of Nettleton. All 29.7 miles of Alternative B would be construction of new track. No existing track would require reconditioning, but the existing track between Eason Boulevard and the reconnection point north of Nettleton would remain as a spur to service existing rail customers. The length of bridges and trestle required to span floodplains and other water features would be approximately 6,400 feet. Twenty-one new public at-grade roadway crossings would be needed along the alternative corridor, but 17 existing public at-grade crossings including Crosstown would be closed, with four others reduced to spur traffic. Nine existing major roadways would require grade-separations over the new rail line. No existing highway overpasses would require modifications. The right-of-way width would vary from 100 to 200 feet.

2.2.4 Alternative C

Alternative C, approximately 30.4 miles in length, would bypass Tupelo to the east and depart the BNSF main line between the city limits of Sherman and Tupelo, shown on **Figure 2-4**. The route travels east and crosses Town Creek and Busfaloba Creek, Yonaba Creek, and Mud Creek. The route would then join the KCS rail line in the City of Saltillo and run along the existing KCS rail line to south of US 78. The route would run south to join the BNSF main line north of Eason Boulevard. Approximately 12.6 miles of new track would be constructed for Alternative C. Approximately 3.8 miles of existing KCS track would be upgraded. The remaining approximately 14.0 miles of existing BNSF track would not require additional improvements. The length of rail bridges and trestle required to span floodplains and other water features would be approximately 7,900 feet. Eight new public at-grade roadway crossings would be needed for this alternative. Eight existing public at-grade crossings would remain in use, but 15 existing public at-grade crossings would be closed for Alternative C, including Crosstown. Seven existing major roadways would require grade-separations and three existing highway overpasses would require modifications. The right-of-way width would vary from 100 to 200 feet.





 Railroad	 Proposed Road	 City Boundary
 Bridge	 Subdivision	 County Boundary
 RR Crossing (Active)	 River / Stream	 FEMA Floodplain
 Natchez Trace Pkwy		

**Tupelo Mississippi Railroad Relocation
Planning & Environmental Study**

Alternatives B-F
Figure 2-4

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2.2.5 Alternative D

Alternative D is approximately 28.0 miles in length and would bypass Tupelo to the east. Alternative D would depart the BNSF main line between the city limits of Sherman and Tupelo, shown on **Figure 2-4**. The route travels east and crosses Town Creek, Busfaloba Creek, Yonaba Creek, the Natchez Trace Parkway, and Mud Creek. The alignment joins the KCS rail line at approximately MP 283.5 north of Barnes Crossing. After the departure from the KCS rail line, the route would run south to join the BNSF main line north of Eason Boulevard. Approximately 12.2 miles of new track would be constructed for Alternative D, while approximately 1.8 miles of existing KCS track would be upgraded. The remaining approximately 14.0 miles of existing BNSF track would not require additional improvements. The length of rail bridges and trestles required to span floodplains and other water features would be approximately 7,200 feet. Seven new public at-grade crossings would be required for this alternative. Eight existing public at-grade crossings would remain in use, but 15 existing public at-grade crossings would be closed for Alternative D, including Crosstown. Seven existing major roadways would require grade-separations. One existing highway overpass would require modifications. The right-of-way width would vary from 100 to 200 feet.

2.2.6 Alternative E

Alternative E would bypass Tupelo to the east and is approximately 35.1 miles in length. Alternative E would depart the BNSF main line between the city limits of Sherman and Tupelo, shown on **Figure 2-4**. The route travels east and crosses Town Creek, Busfaloba Creek, Yonaba Creek, Mud Creek, the Natchez Trace Parkway, and crosses the KCS rail line. The alignment then continues east to cross Sand Creek and Tulip Creek north of Lake Sequoyah. The route then turns south to roughly follow Tulip Creek and crosses US 78 and South Tulip Creek. The route then avoids Tombigbee State Park and Lakewood Park and roughly follows Garrett Creek and joins the BNSF main line at approximately MP 593.4, south of Plantersville. Approximately 24.9 miles of new track would be constructed for Alternative E. Approximately 10.2 miles of existing BNSF track would not be upgraded. The length of rail bridges and trestles required to span floodplains and other water features would be approximately 8,600 feet. Eight existing public at-grade crossings would remain in use, but three of those would be reduced to spur traffic. Nineteen new public at-grade roadway crossings would be needed along the alternative corridor. Thirteen existing public at-grade crossings would be closed, including Crosstown. Seven existing major roadways would require grade-separations. No existing highway overpasses would require modifications. The right-of-way width would vary from 100 to 200 feet.

2.2.7 Alternative F

Alternative F, approximately 38.8 miles in length, would depart the BNSF main line between the city limits of Sherman and Tupelo and bypass Tupelo to the east, shown on **Figure 2-4**. The route travels east and crosses Town Creek, Busfaloba Creek, Yonaba Creek, Mud Creek, the Natchez Trace Parkway, and crosses the KCS rail line. The alignment then continues east to cross Sand Creek and Tulip Creek north of



Lake Sequoyah. The route continues east, crossing Boguefala Creek, then turns south to roughly follow Boguefala Creek crossing US Highway 78. The route avoids the town of Mooreville and crosses Bougegaba Creek and continues south to roughly follow Smith Creek to join the BNSF main line at approximately MP 594.6 between Plantersville and Nettleton. Approximately 29.8 miles of new track would be constructed for Alternative F. Approximately 9.0 miles of existing track would not be upgraded. The length of rail bridges and trestles required to span floodplains and other water features would be approximately 9,600 feet. Eight existing public at-grade crossings would remain in use, but three of those would be reduced to spur traffic. Twenty-three new public at-grade roadway crossings would be needed along the alternative corridor. Thirteen existing public at-grade crossings would be closed, including Crosstown. Nine existing major roadways would require grade-separations. No existing highway overpasses would require modifications. The right-of-way width would vary from 100 to 200 feet.

2.3 SCOPING ALTERNATIVES

The scoping process involved the interaction of several government agencies, officials, stakeholders, and the public to compare and contrast the alternatives developed during the *Phase I Feasibility Analysis* (HDR, May 2006), develop additional alternatives, and recommend alternatives for further study.

2.3.1 Scoping Meeting

Several meetings were held to present the *Phase I - Feasibility Analysis* (HDR, May 2006) alternatives to the public, government agencies and public officials. These meetings included an Agency Scoping Meeting held on August 14, 2006, a Public Meeting held on August 15, 2006, and Public/Elected Officials Scoping Meetings held on November 29, 2005, August 15, 2006, and November 17, 2006. All of the meetings were held in Tupelo, Mississippi. Representatives from the following agencies were in attendance at these various meetings:

- City of Saltillo
- City of Tupelo
- City of Verona
- Environmental Protection Agency
- Federal Highway Administration
- Federal Railroad Administration
- Lee County
- Natchez Trace Parkway (U.S. National Park Service)
- Town of Plantersville
- Town of Shannon
- U.S. Fish and Wildlife Service

The following is a summary of verbal comments made by agencies at the scoping meetings:



- Natchez Trace Parkway Superintendent supports Alternative C because it utilizes an existing crossing and has the least amount of impact on the Natchez Trace Parkway.
- Invitation letters for agencies to become Cooperating Agencies would be mailed out as appropriate.

The public meeting generated 52 comments that mostly supported either an in-town alternative or an operational improvement and generally opposed any of the proposed bypass alignments.

2.3.2 New Scoping Alternatives

As a result of the scoping process, five new alternatives were recommended for further evaluation by the study team.

2.3.2.1 Alternative G

This alternative would lower the BNSF main line into a trench under Crosstown. Crosstown and other cross streets would be reconstructed on a bridge structure over the trench. Guardrail, barrier wall, and fencing would be mandatory so that people, vehicles, and debris are prevented from falling onto the tracks in the trench and disrupting rail service.



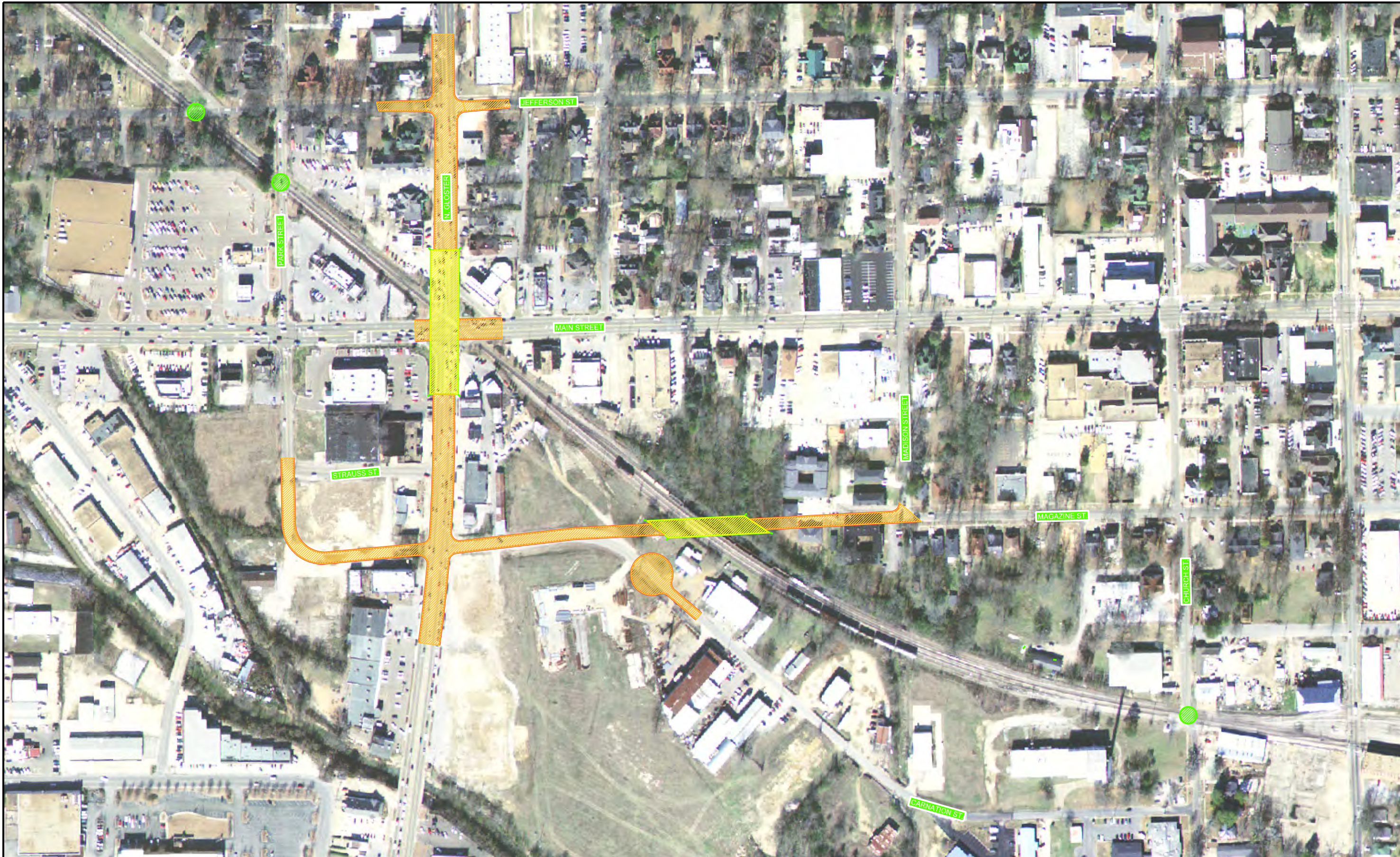
Railroad Trench in Reno, Nevada







A separate and temporary rail corridor would be required to maintain railroad traffic during construction requiring significant temporary right-of-way.

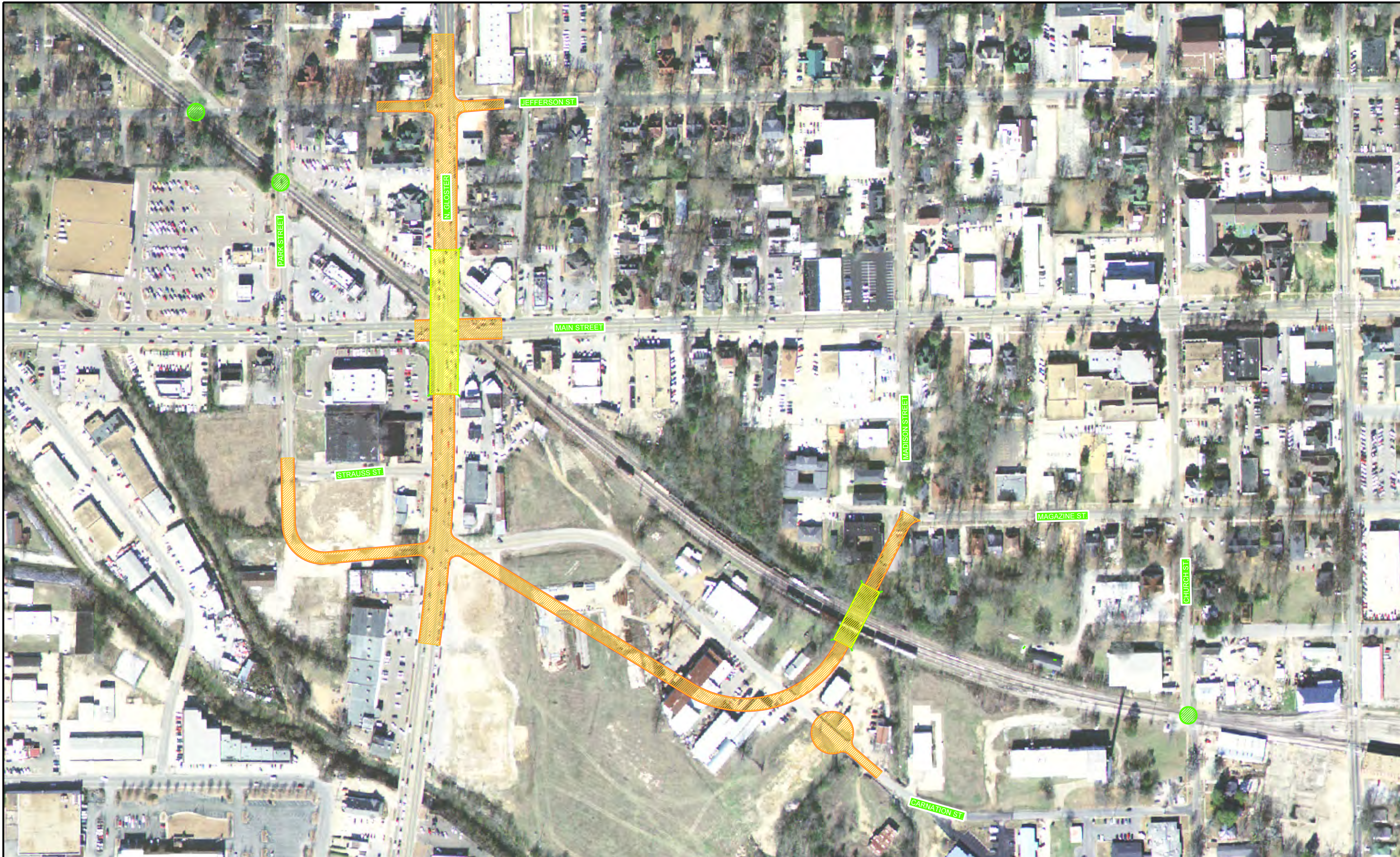
Lowering the BNSF profile grade would require the profile grade of the switching yard with the KCS rail line to be lowered. Since the existing yard is located within an existing floodplain, issues with drainage, permitting, and maintaining rail operations would need to be addressed.

2.3.2.2 Alternative H

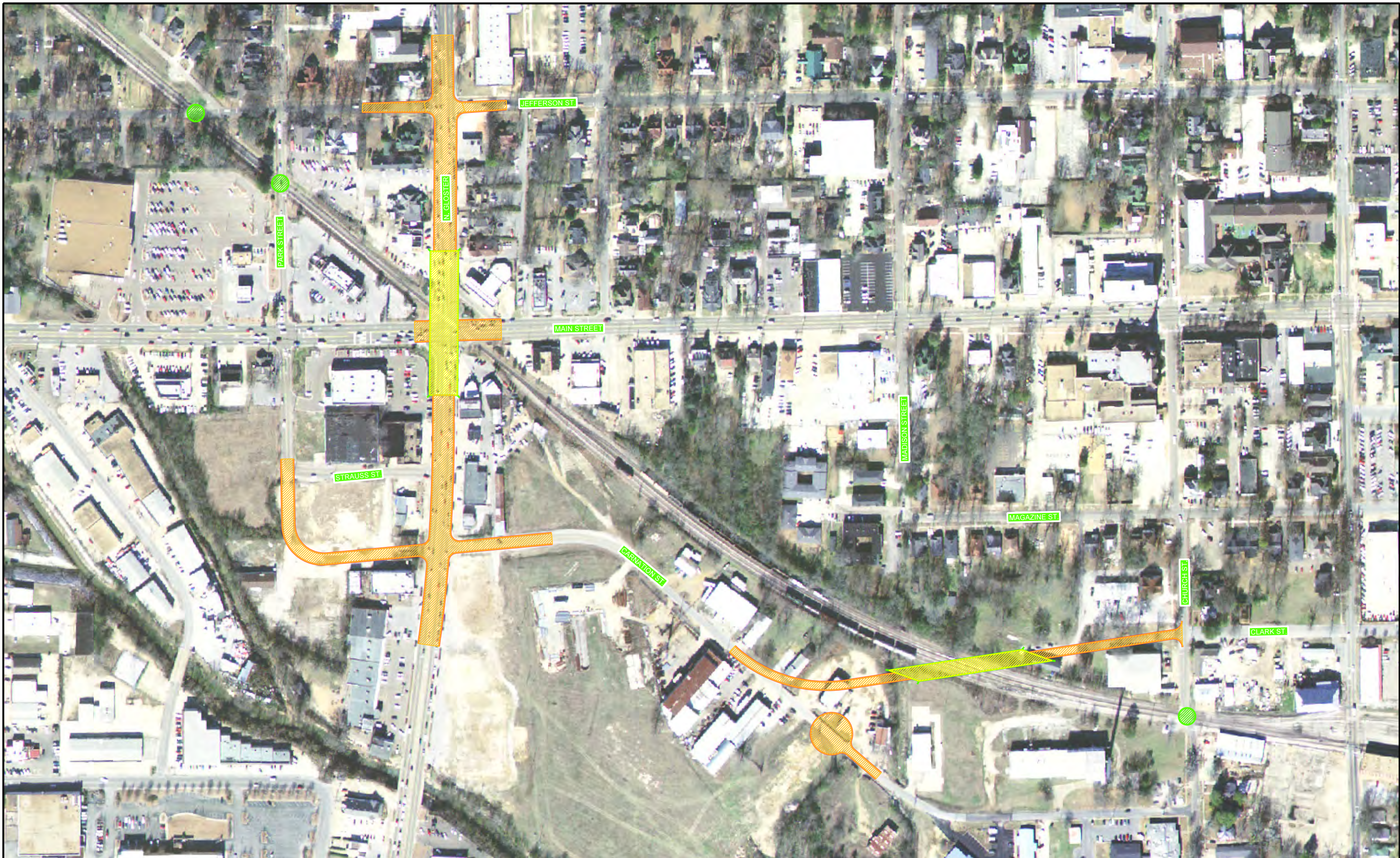
This alternative was derived from the In-town Scenario 1, but consists of the grade separation of Gloster Street over both Main Street and the BNSF main line, instead of both roadways over the BNSF. A significant portion of the traffic at Crosstown would be removed from conflict with the rail movements. This alternative would also require the construction of a second roadway overpass such that the Main Street traffic may bypass the at-grade crossing during interchange operations. Three options were developed based on this concept, shown on **Figure 2-5**, **Figure 2-6**, and **Figure 2-7**.









	LEGEND PROPOSED BRIDGE  UPGRADED RR CROSSING  PROPOSED ROADWAY 	 	Tupelo Railroad Relocation Planning and Environmental Study		Figure 2-5
			Alternative H - Option A		



	LEGEND PROPOSED BRIDGE  UPGRADED RR CROSSING  PROPOSED ROADWAY 	 	Tupelo Railroad Relocation Planning and Environmental Study		Figure 2-6
			Alternative H - Option B		



	<p>LEGEND</p> <p>PROPOSED BRIDGE </p> <p>UPGRADED RR CROSSING </p> <p>PROPOSED ROADWAY </p>	 	<p>Tupelo Railroad Relocation Planning and Environmental Study</p>		<p>Figure 2-7</p>
			<p>Alternative H - Option C</p>		

Each layout includes an overpass on Gloster Street over the railroad, while providing a bypass route for Main Street.

2.3.2.3 Alternative I

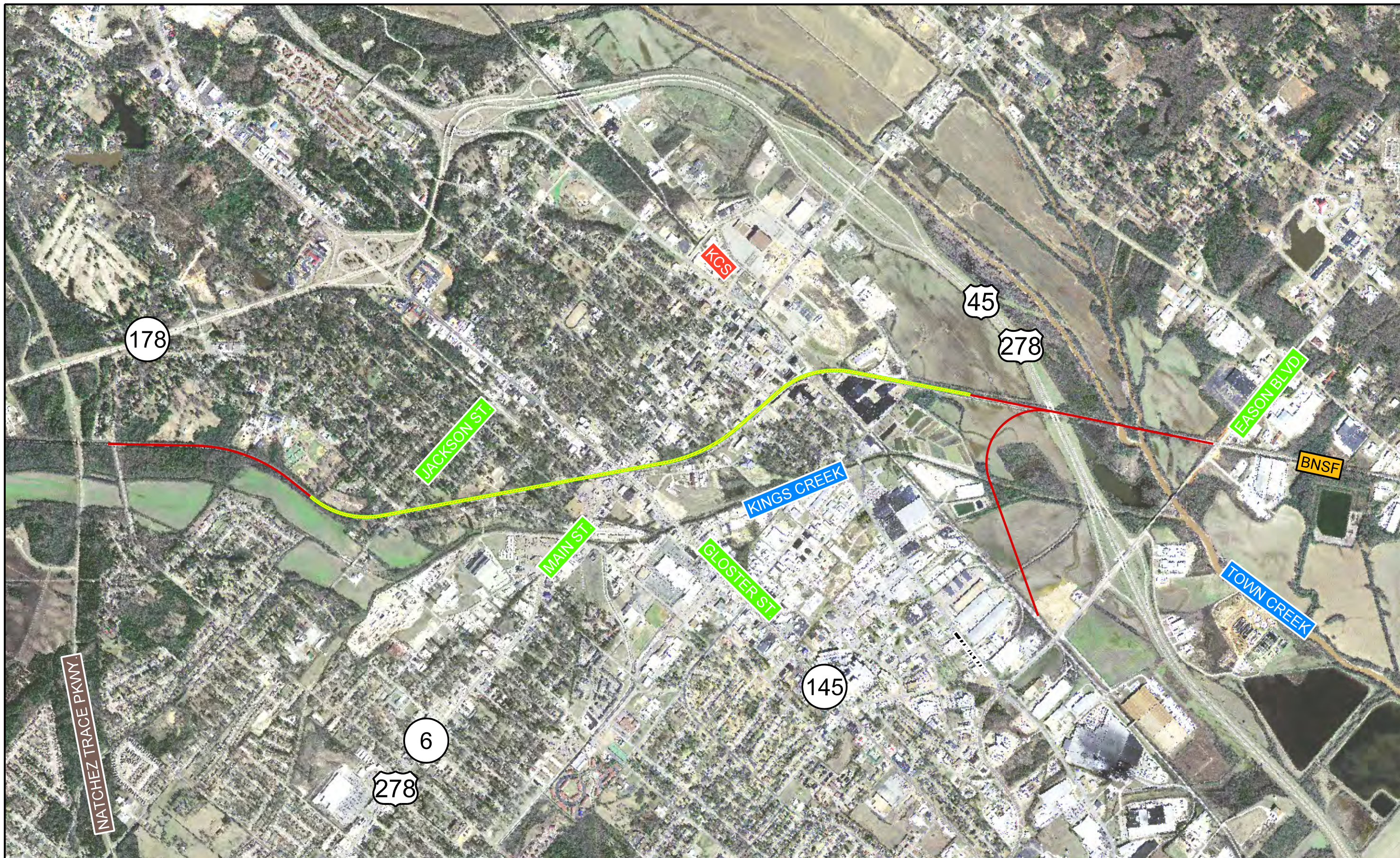
This alternative, shown on **Figure 2-8**, would consist of a long, completely elevated rail viaduct, predominantly located adjacent to the existing railroad right-of-way, to grade separate the BNSF main line over the at-grade road crossings through Tupelo and the KCS rail line, including Crosstown. Five elevated typical sections were developed to include single track, double track, and a potential shared-use path within the existing 100-foot railroad right-of-way, shown on **Figure 2-9**. The new route would parallel the existing track, except where modified curvature would allow trains to travel at 40 mph. The rail interchange would be as described in the operational improvement in **Section 2.2.1**.

2.3.2.4 Alternative J

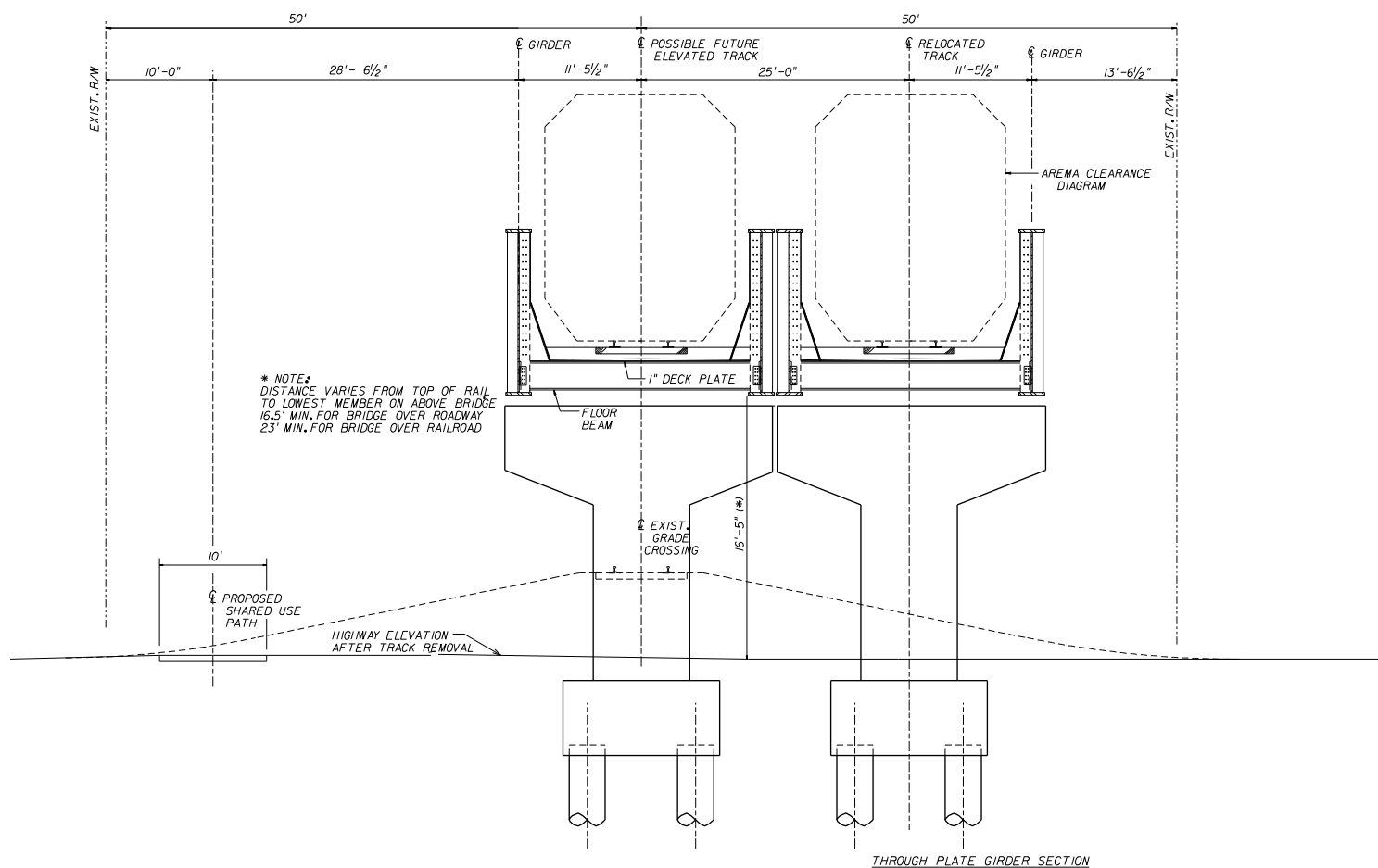
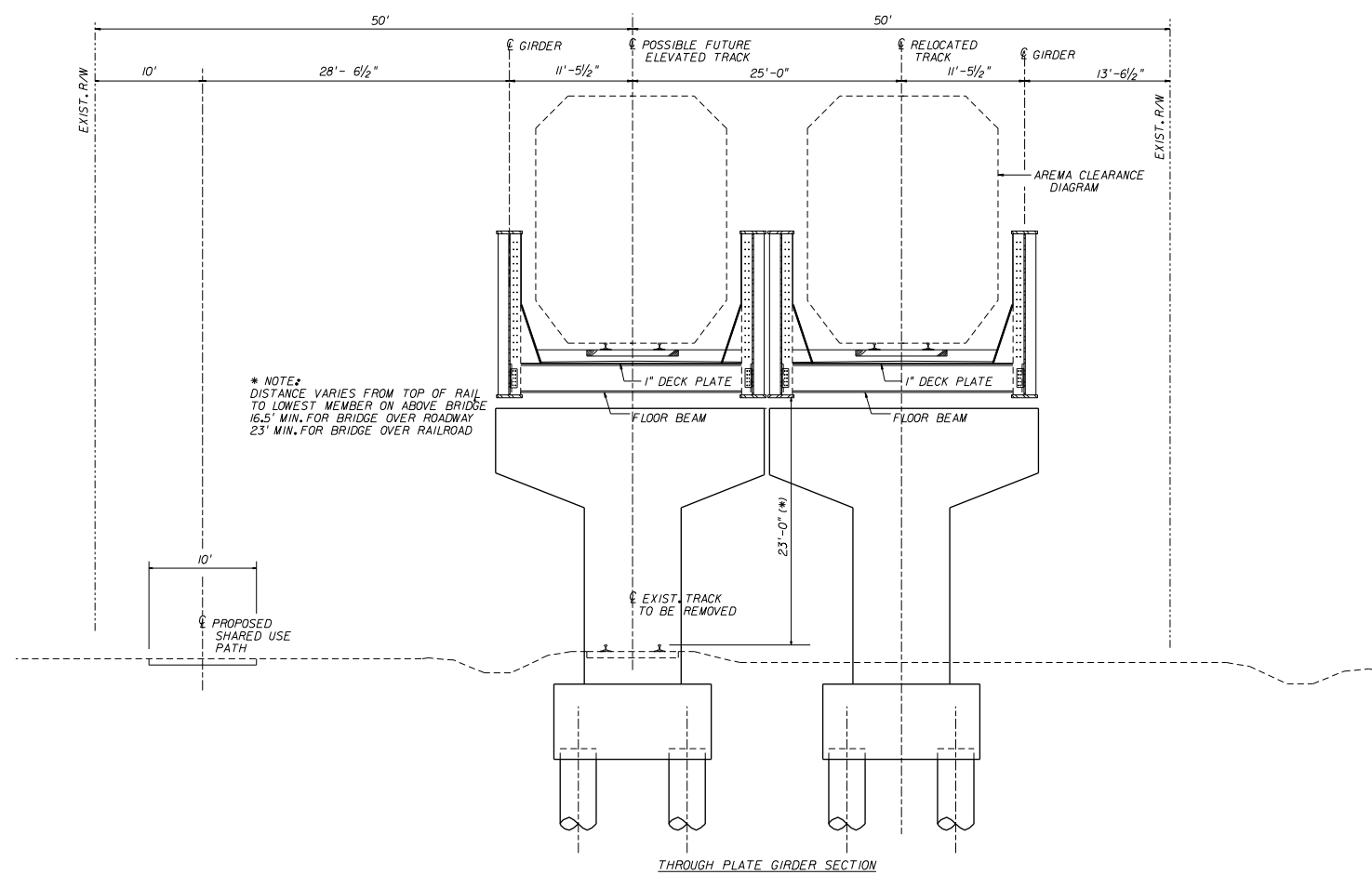
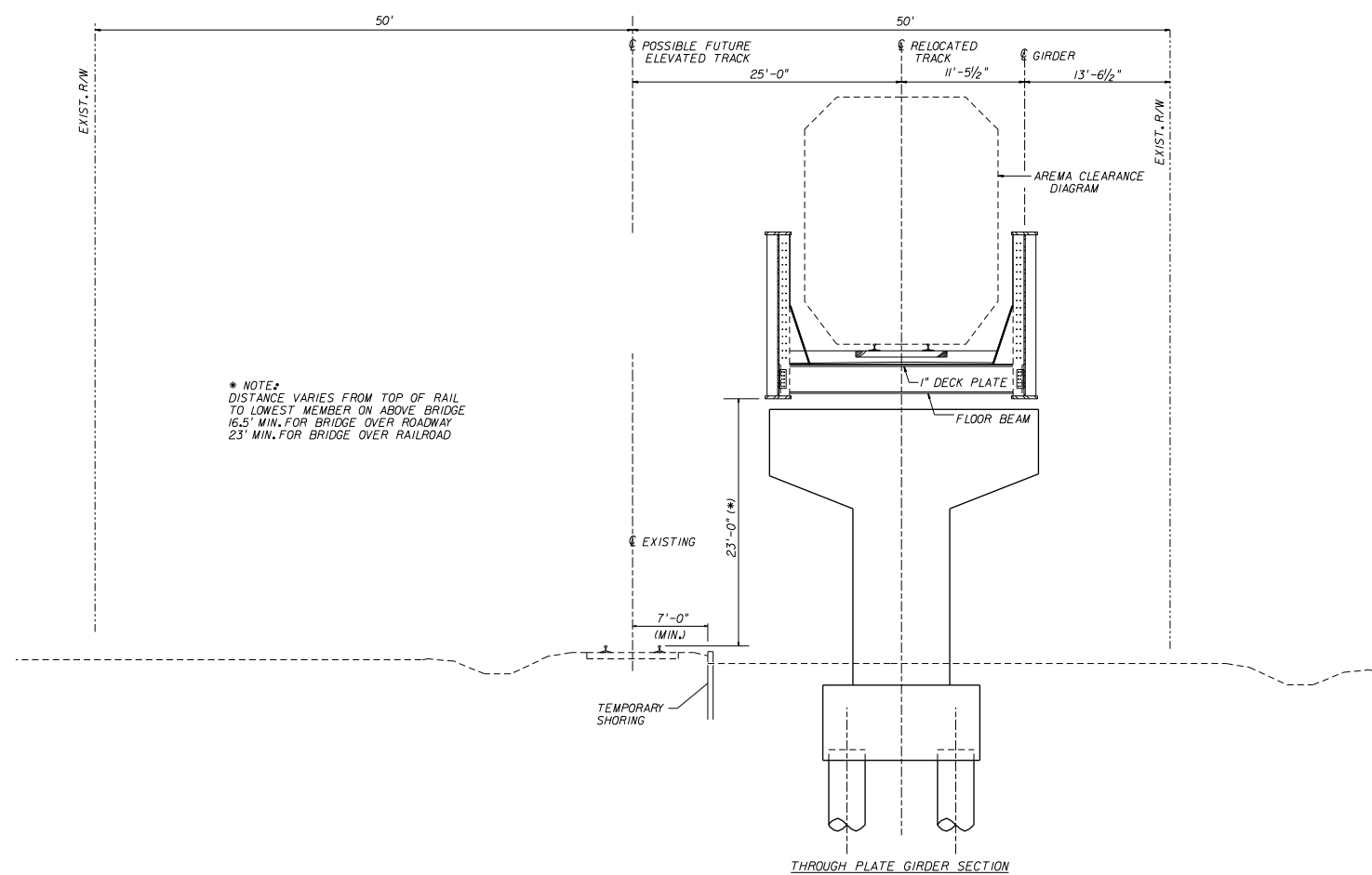
This alternative, approximately 22.6 miles long, was derived from Alternative D and parallels US 78 (I-22) along undeveloped properties to the north, shown on **Figure 2-10**. The alignment would bypass Tupelo, and then turn south to parallel Town Creek and intersect the existing BNSF main line north of Eason Boulevard. The existing interchange with the KCS rail line would be eliminated and replaced with a grade separated crossing. The rail interchange would be as described in the operational improvement in **Section 2.2.1**. Alternative J would require construction of approximately 10.8 miles of new track. Approximately 11.8 miles of existing track would not require additional improvements. The length of rail bridges and trestle required to span floodplains and other water features would be approximately 9,580 feet. Eight existing public at-grade crossings would remain in use, but 14 existing public at-grade crossings would be closed for Alternative J, including Crosstown. Nine existing major roadways would require grade-separations. One existing highway overpass would require modifications. The right-of-way width would vary from 100 to 200 feet.

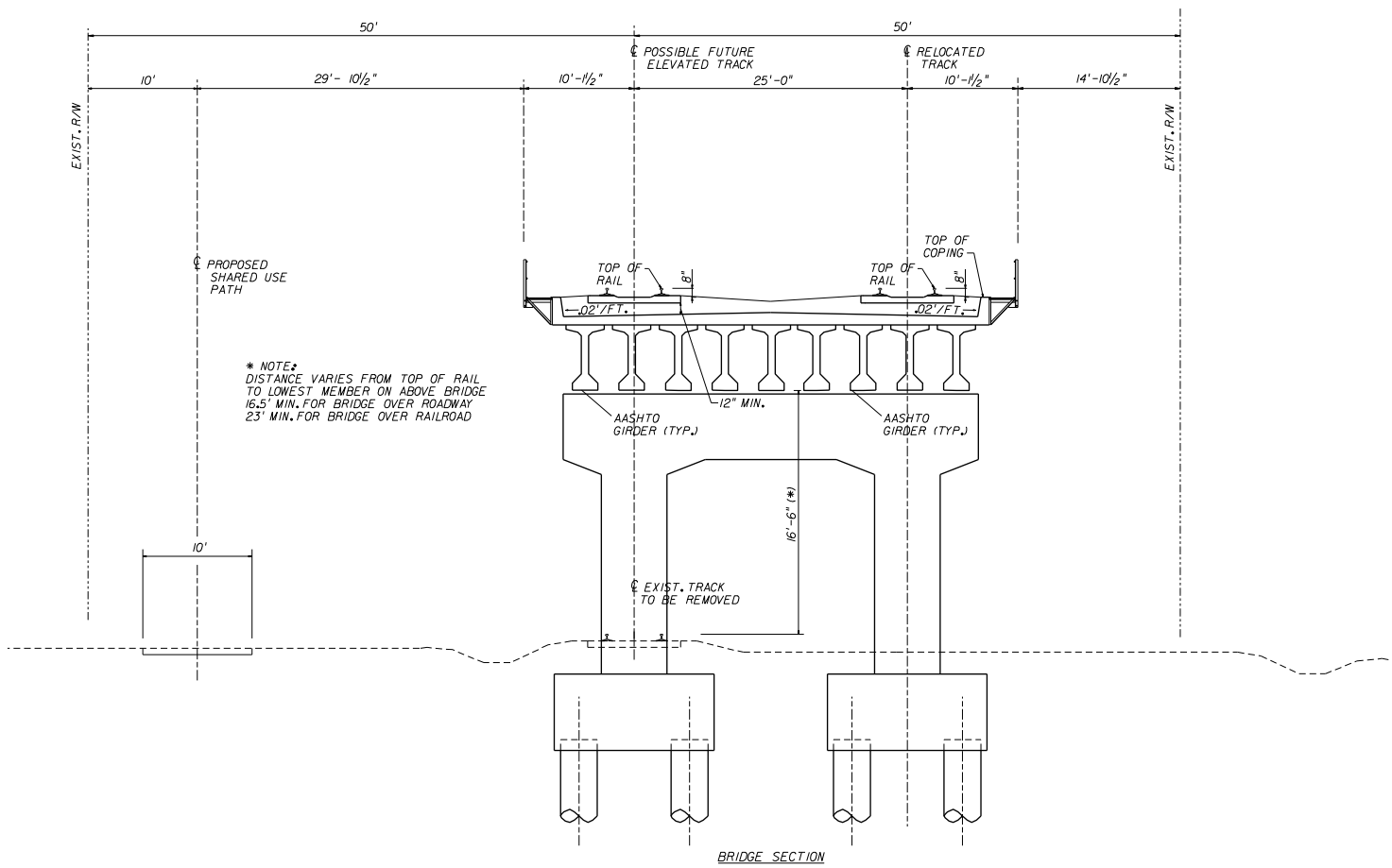
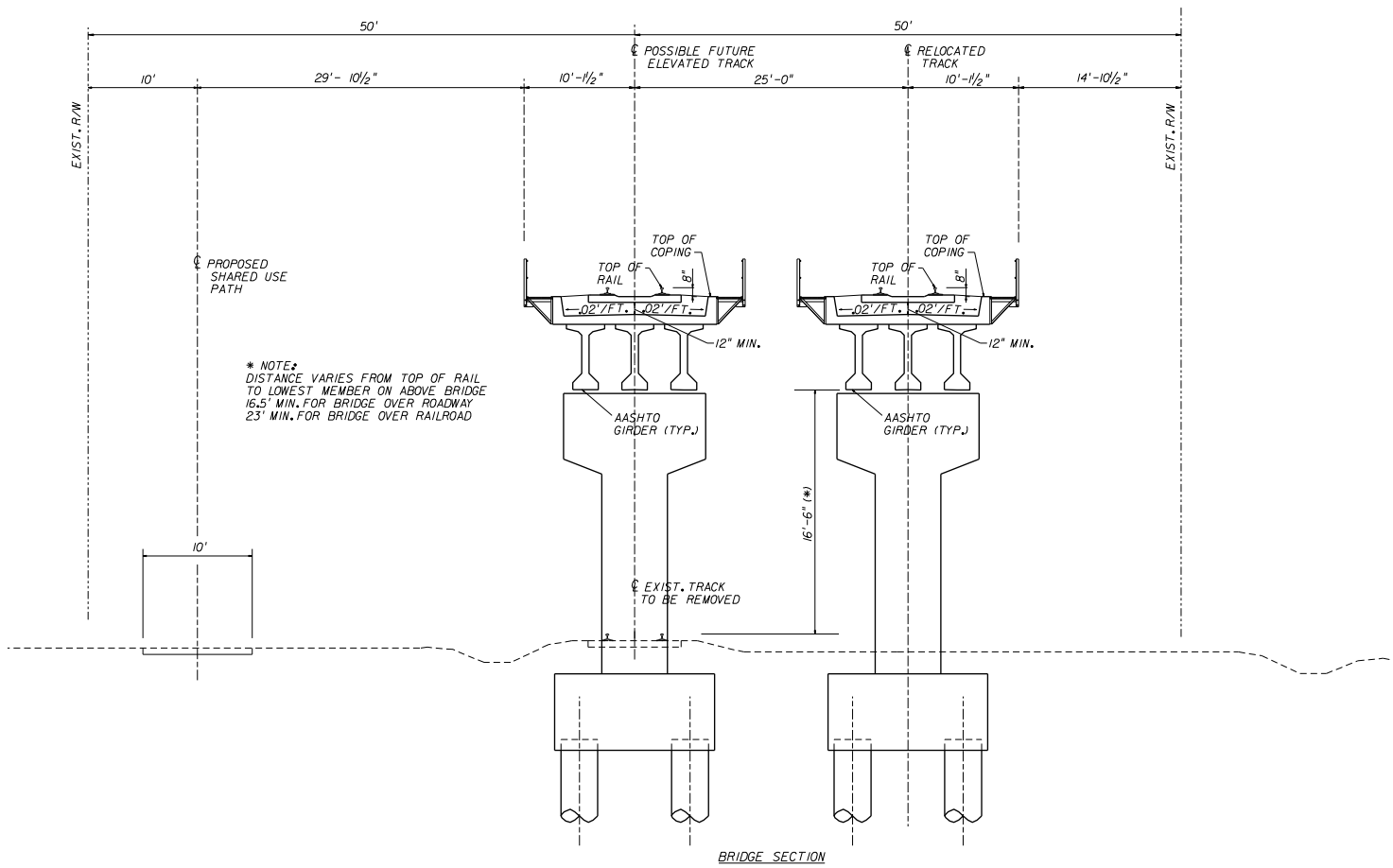
2.3.2.5 Alternative K

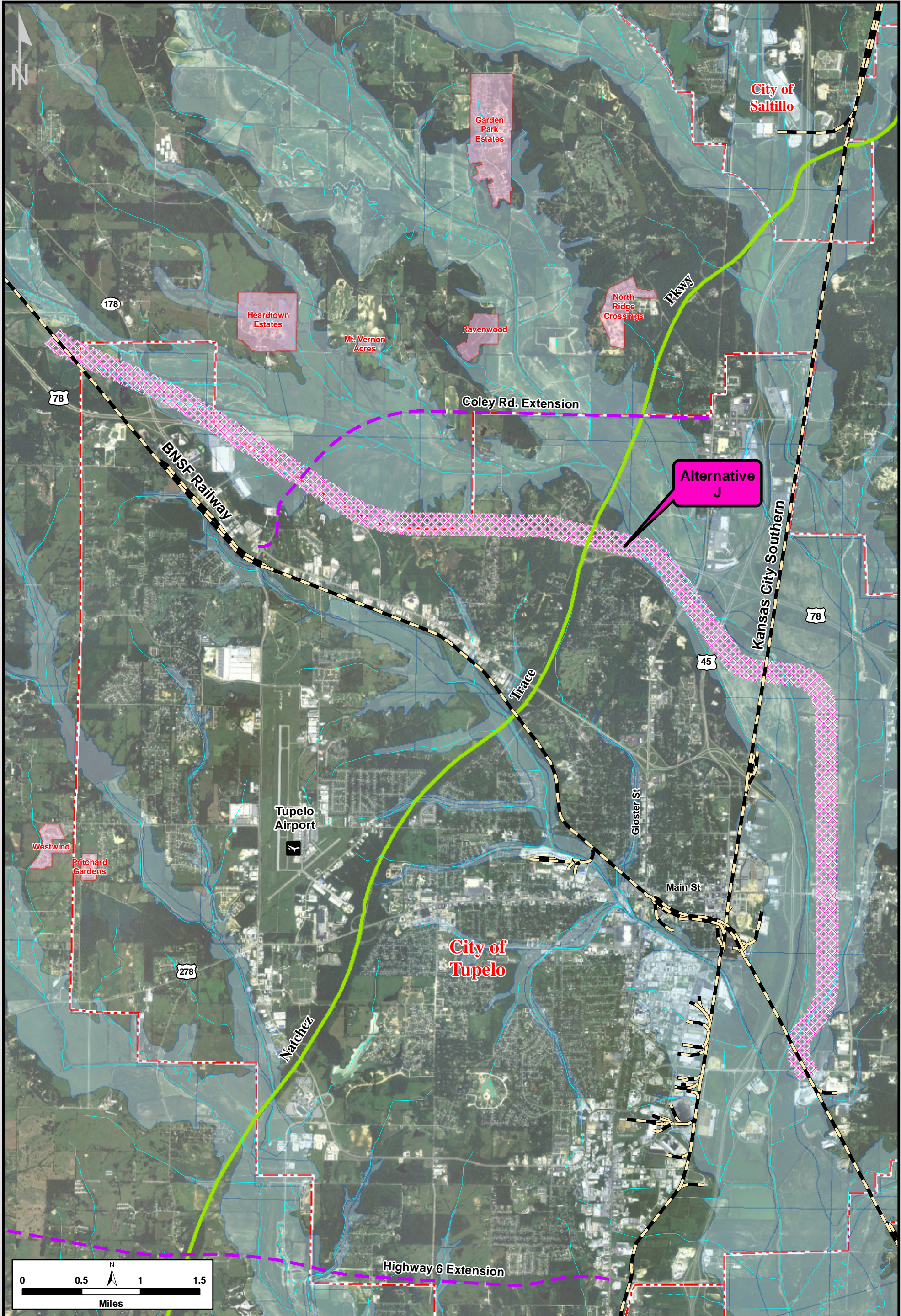
This alternative, approximately 26.8 miles long, was developed from an alternative initially proposed by the *Urban Rail Relocations Study* (Wilbur Smith and Associates, March 2002) and Alternative B. The alignment would extend south from the BNSF main line north of Sherman and would roughly parallel Coonewah Creek south and west to intersect the BNSF main line north of Nettleton, shown on **Figure 2-11**. All 26.8 miles of Alternative K would require construction of new track. The length of rail bridges and trestle required to span floodplains and other water features would be approximately 13,880 feet. Four existing public at-grade crossings would remain in use, but 17 existing public at-grade crossings would be closed for Alternative K, including Crosstown. Nine existing major roadways would require grade-separations and 20 new at-grade crossings would be included. The right-of-way width would vary from 100 to 200 feet.




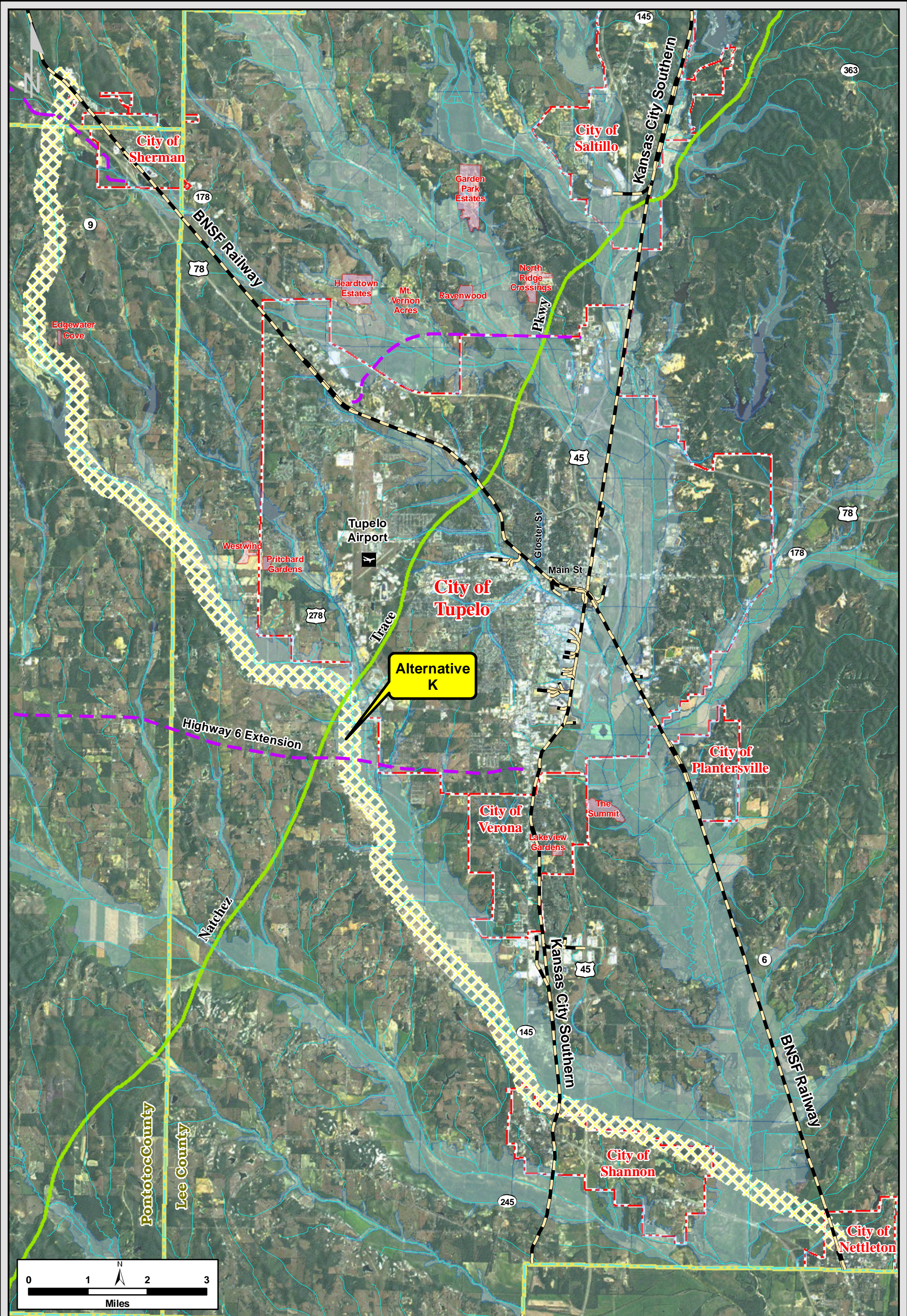
	<p>LEGEND</p> <p>PROPOSED RR BRIDGE </p> <p>PROPOSED AT-GRADE RR </p>		<p>Tupelo Railroad Relocation Planning and Environmental Study</p> <p>Alternative I</p>	
			<p>Figure 2-8</p>	







	LEGEND	<ul style="list-style-type: none">Proposed RoadSubdivisionRailroadCity BoundaryNatchez Trace PkwyRiver / StreamFEMA Floodplain	Tupelo Mississippi Railroad Relocation Planning & Environmental Study	Alternative J
				Figure 2-10



	LEGEND			Tupelo Mississippi Railroad Relocation Planning & Environmental Study	Alternative K
	Railroad	Subdivision	City Boundary		Figure 2-11
	Natchez Trace Pkwy	River / Stream	County Boundary		
	Proposed Road	FEMA Floodplain			

2.4 INITIAL ALTERNATIVE REFINEMENTS

2.4.1 Alternatives Meeting

MDOT held a meeting on February 21, 2007 with the project team in Tupelo to discuss the refinement of the proposed alternatives under consideration for the project. The advantages and disadvantages of each alternative were discussed.

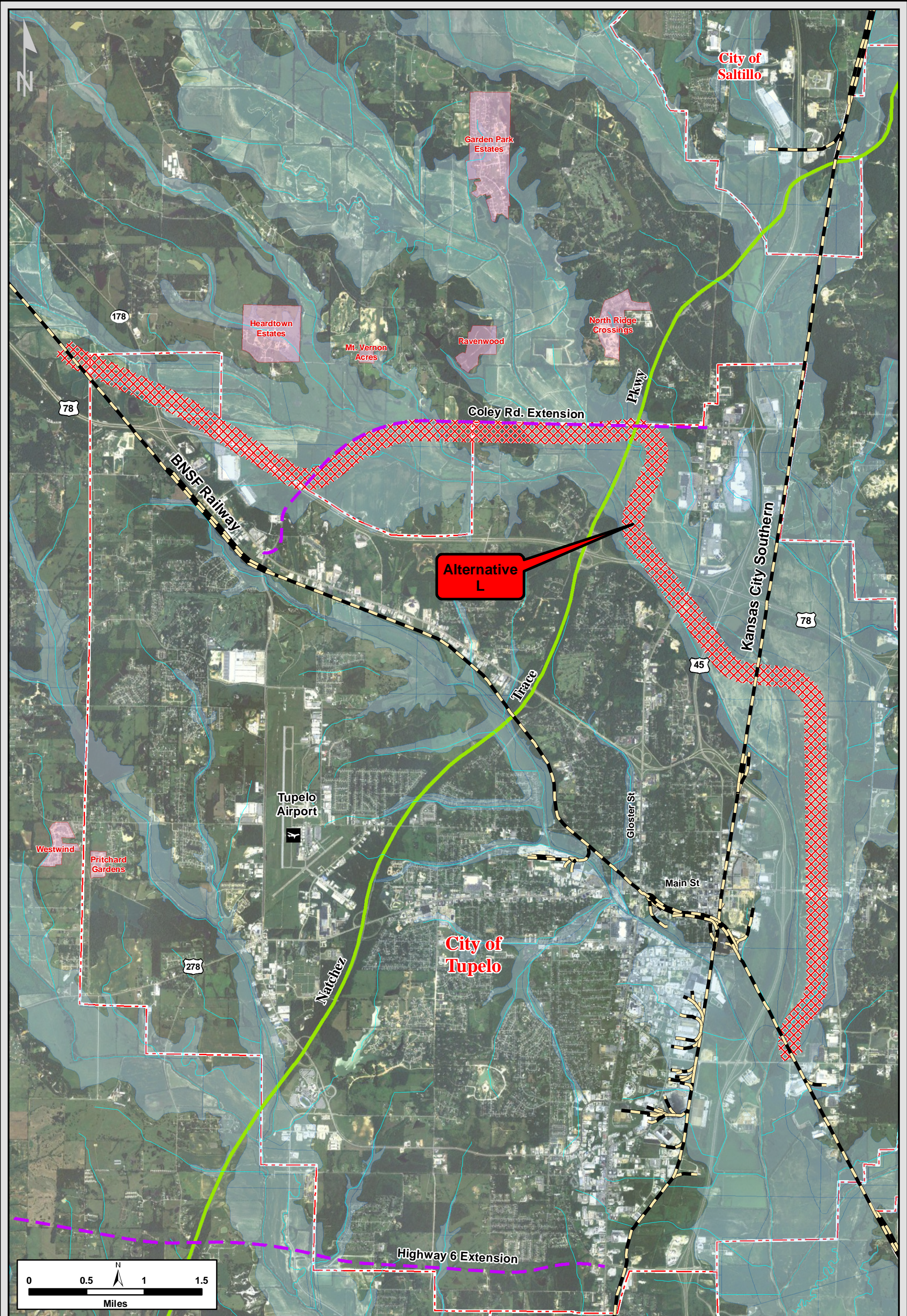
2.4.2 Alternative H

Three options were developed for Alternative H, shown on **Figure 2-5, Figure 2-6, and Figure 2-7**, with each layout including an overpass on Gloster Street over Main Street and the BNSF main line, while providing a bypass route for Main Street. Each bypass alternative would require right-of-way acquisition from both residential and industrial parcels.

Utilizing more detailed topographic data not previously available for the *Phase 1 – Feasibility Analysis* (HDR, May 2006), a conceptual plan-profile for the Gloster Street overpass was developed using MDOT design criteria for arterial roadways. Based on the grades at each approach to elevate Gloster Street over the railroad, MDOT determined that a significant amount of retaining walls would be required north of Crosstown and within the vicinity of the public elementary school at Jefferson Street for the construction limits to remain within the existing right-of-way. The profile of Jefferson Street would have to be raised enough that access to the adjacent historic properties would be prohibited.

2.4.3 Alternative L

Alternative J presented many engineering challenges, including the rail line interfering with the interchange between the Natchez Trace Parkway and US 78 and skewed crossings at US 78, Gloster Street, US 45, and the KCS rail line. The new alignment (Alternative L) was considered to share the proposed crossing of the Natchez Trace Parkway with the proposed Coley Road Extension. Alternative L, approximately 26.8 miles long and shown on **Figure 2-12**, is the hybrid between Alternative D and Alternative J. This alternative would leave the existing BNSF main line north of State Road (MS) 178, cross under MS 178, then turn to cross under the proposed Coley Road Extension, and then turn parallel to the new roadway. The alignment would cross the Natchez Trace Parkway in a joint crossing with the proposed Coley Road Extension and would then turn south to cross US 78, Gloster Street, and US 45. It would then cross the KCS rail line, continue south to cross Main Street, and merge with the BNSF main line. Approximately 11.9 miles of new track would be constructed for Alternative L. The remaining approximately 14.9 miles of existing track would not require additional improvements. The length of rail bridges and trestle required to span floodplains and other water features would be approximately 13,370 feet. Eight existing public at-grade crossings would remain in use, but 14 existing public at-grade crossings would be closed for Alternative L, including Crosstown. Seven existing major roadways would require grade-separations. The right-of-way width would vary from 100 to 200 feet.



	LEGEND	<ul style="list-style-type: none">Proposed RoadSubdivision	Tupelo Mississippi Railroad Relocation Planning & Environmental Study	Alternative L
	<ul style="list-style-type: none">RailroadCity BoundaryNatchez Trace Pkwy	<ul style="list-style-type: none">River / StreamFEMA Floodplain		Figure 2-12



2.4.4 Alternative M

Alternative M was derived from Alternative I, shown on **Figure 2-8**, and consists of an elevated rail viaduct with the limited use of retaining walls within the existing railroad right-of-way. The length of rail viaduct would be reduced with the addition of retaining walls. The rail would then be placed on earthen fill for the limits of the retaining wall. The route would parallel the existing track, except where modified curvature would allow trains to travel at 40 mph and stay within the existing BNSF right-of-way. The rail interchange would be as described in the operational improvement in **Section 2.2.1**. Eight existing public at-grade crossings would remain in use, but 11 existing public at-grade crossings would be closed for Alternative M, including Crosstown. Eleven existing roadways would require grade-separations and no new at-grade crossings would be included.

2.5 NATIVE AMERICAN RESOURCES

Northeast Mississippi is the historic home to the Chickasaw Indians. The Chickasaw people inhabited the Lee County area at least as long as, but probably much longer than, the tribe's contact with European visitors in the 1500's. The Chickasaw tribe moved northward from central Mississippi along the Black Prairie region as explorers encroached on their land. The majority of the Chickasaw settlements of the 17th and 18th Centuries were located to the south and west of where the present City of Tupelo footprint lies, shown on **Figure 2-13**.

The archaeology of the tribe's settlements has become a burgeoning field of study. All of the archaeological and documentary evidence suggest the Chickasaw towns were located in and around Lee County, with a particular concentration in present-day Tupelo. Traditionally, the Chickasaw are known to have buried their dead underneath their houses, so the disturbance of any Chickasaw village could mean the potential disturbance of a burial site. Since the majority of these village sites are not specifically identified, it is assumed that any new corridor or construction to the south and west of Tupelo could have a high probability of disturbance of a Chickasaw burial ground.

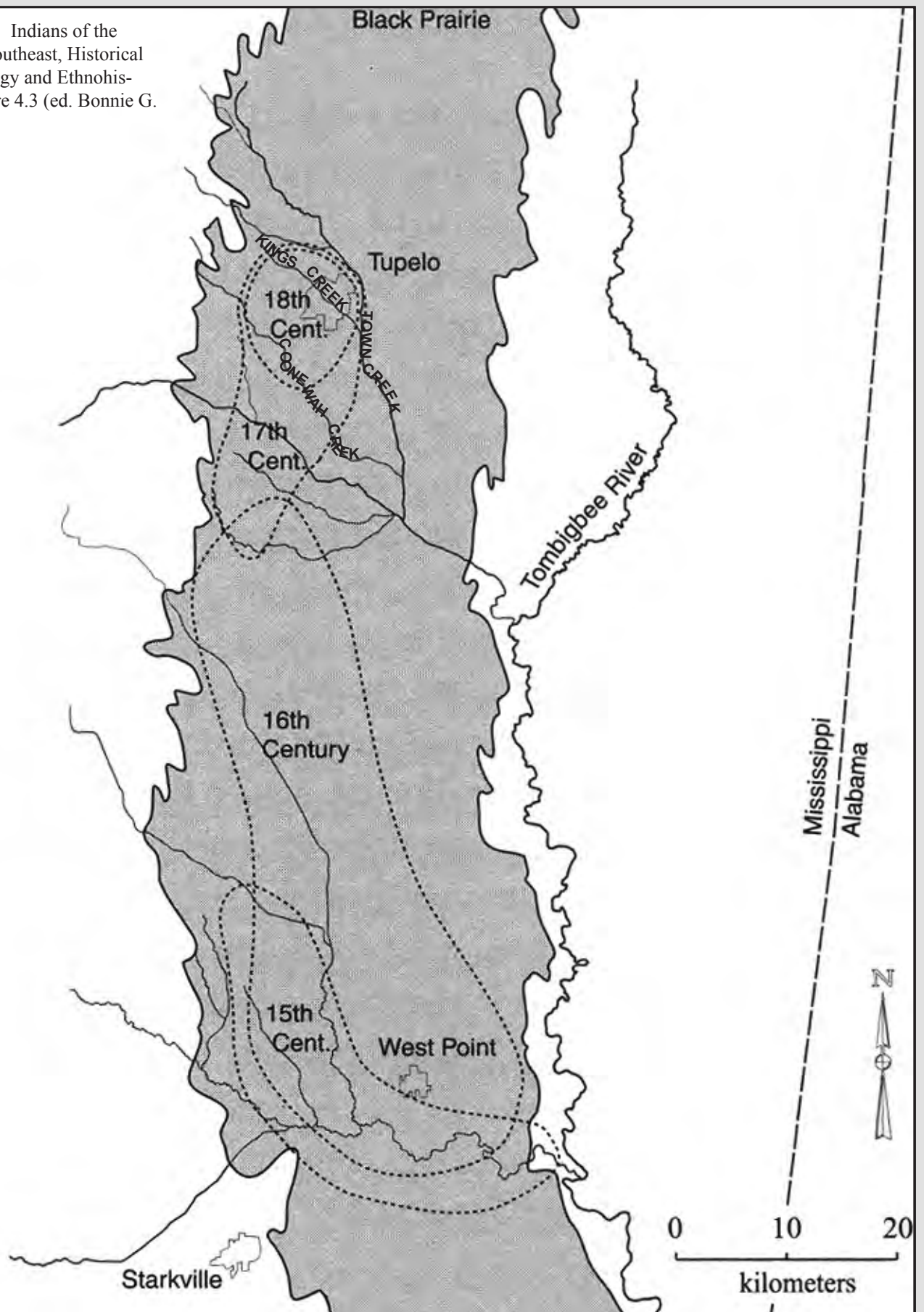
2.6 INITIAL ALTERNATIVES ANALYSIS

Each alternative was analyzed using the geographic information systems (GIS) data and aerial photography collected for the study area to determine whether it satisfied the aspects of the project's Purpose and Need, as defined in **Chapter 1**. Evaluation measures were also developed by MDOT to provide a comparison of the impacts among the alternatives.

2.6.1 Evaluation Measures

Evaluation measures were used to compare each of the proposed alternatives and used to determine how well the alternative satisfied the project's Purpose and Need. Evaluation measures were divided into four sections: Engineering, Environmental, Operations, and Costs. To standardize the analysis, the alternatives were compared from the common connection points to the existing BNSF main line. The northern point is north of the Town of Sherman at approximately MP 575.5. The southern connection point is north of the Town of Nettleton at approximately MP 600.0.

SOURCE: Indians of the Greater Southeast, Historical Archaeology and Ethnohistory, Figure 4.3 (ed. Bonnie G. McEwan)



LEGEND

Tupelo Mississippi Railroad Relocation
Planning & Environmental Study

Chickasaw
Settlements

Figure 2-13



2.6.1.1 Engineering

The engineering factors were calculated based upon the preliminary alignment geometry for each alternative, and comparison to aerial photography and GIS data. The engineering factors considered for comparison include the following:

Alignment Statistics

The alignment statistics include total length of the new corridor, length of existing BNSF and KCS corridors to be used, number of proposed grade-separations, estimated total length of bridges/trestles required, additional operational distance for both BNSF and KCS, and number of interchange modifications required.

Safety

The safety factors include the total number of existing grade-separations used, the total number of existing public at-grade crossings used, the total number of public at-grade crossings closed (either by grade separation or track removal), the total number of proposed at-grade crossings, and the total number of proposed grade separations. All existing streets were assumed to require crossings, either by grade separations or at-grade crossings.

2.6.1.2 Environmental

The environmental factors were calculated based upon the respective preliminary alternative comparison to GIS data. The environmental factors considered for comparison include the following:

Human Environment

The human environment includes number of community facilities impacted, number of educational facilities near the alternative alignment, and population density.

Natural Environment

The natural environment includes number of stream crossings (perennial and intermittent), area of wetland impacts, area of floodplain encroachment, and assessment of likely occurrences of threatened and endangered species near the alternative alignment.

Physical Environment

The physical environment includes number of historical sites, number of water supply wells, and number of contamination sites near the alternative alignment.

2.6.1.3 Operations

With any new alternative alignment, there can be impacts to railroad operations. Typically, operational impacts can be analyzed in train-miles, ton-miles, or train-hours. These units of measure are referred to as operating units. Since carload and train traffic data are often difficult to forecast, the



operational impact analysis quantified the estimate change in train-miles. Distances for the BNSF trains were calculated from a common northern point (MP 575.5) to a common southern point (MP 600.0). The additional length of the alternative alignments would produce a cost to BNSF to operate and maintain both the trains and the physical improvements. The alternatives which maintain the existing alignment would not show an increase in travel distance. However, the alternatives which divert from the existing alignment would show an increase in both distance and time.

2.6.1.4 Costs

After the alternatives were developed, preliminary construction cost estimates were completed for the railroad physical plant, roadway improvements, and right-of-way acquisition. Unit costs were derived from average cost history.

The operating plan estimates the incremental costs associated with the rerouted rail traffic. The operational improvement and the alternatives remaining in downtown Tupelo would not create any significant additional operating costs since the modifications would be in proximity to the existing interchange operation. BNSF and KCS would incur additional transportation and infrastructure expenses as a consequence of the traffic rerouting for the alternatives that bypass Tupelo.

In addition to the benefit of reduced automobile traffic delay and the reduced risk of automobile/train collisions, the closing/opening of an existing public at-grade rail crossing has an economic value. An additional value from the reduced/increased annual maintenance cost associated with the signal equipment, track work and crossing surface has been calculated for each crossing at approximately \$17,000.

2.6.2 Analysis of Alternatives

The Purpose and Need of the Tupelo Railroad Relocation Project, as defined in **Chapter 1**, would be to reduce the impact of a growing rail service on the region in the following areas:

- Reduce vehicular traffic delays in downtown Tupelo
- Improve response for emergency vehicles
- Improve the safety of the travelling public
- Improve efficiency of railroad operations in the Tupelo area
- Enhance quality of life with regard to traffic flow, noise, and economic development.

In addition to the aspects of the project's Purpose and Need, answers to the following questions about project objectives influenced the development of alternatives and alignments:



- Does the alternative serve the commercial freight needs including existing industries?
- Does the alternative reduce the traffic conflict associated with the at-grade intersections?
- Does the alternative benefit or adversely impact the community or the environment?
- Does the cost of the alternative provide the maximum benefit to the community?

2.6.3 Impact Summary

The impacts associated with each of the alternatives were quantified and compared with the No-Build Alternative (Alternative A). Although the available data are meaningful for planning purposes only, the quantities demonstrate a magnitude of impact. Each alternative has advantages and disadvantages related to engineering, environmental, operations, cost, and other associated factors. **Table 2-1** summarizes the anticipated impacts for each of the evaluation measures for the initial alternatives as described in the *Phase 1 Feasibility Analysis* (HDR, May 2006) and for the scoping alternatives. The analysis for Alternative G and Alternative H was limited and construction costs were not developed for them, as these alternatives were determined to be infeasible early in the alternatives evaluation process, as discussed in **Section 2.6.4.2**.

2.6.4 Alternatives Screening

The impact summaries for each alternative were compared with the aspects of the project's Purpose and Need to determine which alternatives would be further evaluated in the next phase. **Table 2-2** provides a brief description of each alternative.

2.6.4.1 Feasibility Alternatives

Operational Improvements: The operational improvements would allow interchange operations between the BNSF main line and the KCS rail line without interfering with the at-grade crossings, especially Crosstown. However, passing through trains would continue to be the primary source of vehicular traffic delay and horn soundings in central Tupelo would not be eliminated. This alternative was eliminated from consideration as a stand-alone alternative because it did not adequately satisfy the traffic delay, emergency response, safety, and quality of life aspects of the project's Purpose and Need. Due to its ability to remove interchange operations from the at-grade crossings, the interchange concept was included with other alternative alignments.

In-town Alternative Scenario 1: While this alternative would effectively remove the traffic conflict at Crosstown, it would have several adverse impacts to central Tupelo including permanent roadway closures, property acquisition, and business damages. Adjacent properties would need to be acquired, requiring several buildings to be demolished, to provide temporary

Table 2-1 Alternative Evaluation Measures

Evaluation Measures	No-Build Alternative A	Operational Improvement	In-town Alternative		INITIAL ALIGNMENT ALTERNATIVES					SCOPING ALTERNATIVES						
			Scenario 1	Scenario 2	B	C	D	E	F	G	H	I	J	K	L	M
Alignment Statistics																
Est. Length (Miles)	24.5	1.7	n/a	n/a	29.7	30.4	28.0	34.6	38.4	24.5	n/a	24.5	25.5	26.8	26.8	24.5
Est. Length of New Track Construction (Miles)	n/a	1.7	n/a	n/a	29.7	12.6	12.2	24.9	29.8	1.0	n/a	3.0	10.8	26.8	11.9	2.8
Est. Length of Existing BNSF Track (Miles)	24.5	0.0	n/a	n/a	0.0	14.0	14.0	10.2	9.0	23.5	n/a	21.5	14.7	0.0	14.9	21.7
Est. Length of Existing KCS Track (Miles)	n/a	0.0	n/a	n/a	0.0	3.8	1.8	0.0	0.0	0.0	n/a	0.0	0.0	0.0	0.0	0.0
Est. Additional BNSF Operational Distance (Miles)	n/a	0.0	n/a	n/a	5.2	5.9	3.5	10.1	13.9	0.0	n/a	0.0	1.0	2.3	2.3	0.0
Est. Additional KCS Operational Distance (Miles)	n/a	0.9	n/a	n/a	10.4	0.9	0.9	6.7	6.7	0.0	n/a	0.0	0.9	10.4	0.9	0.0
Est. Proposed Total Bridge/Trestle Length (Feet)	n/a	500	n/a	n/a	6,400	7,900	7,200	8,600	9,600	n/a	n/a	16,000	9,580	13,880	13,370	7,200
Est. Proposed Highway Overpass Modifications (No.)	n/a	1	n/a	n/a	0	3	1	0	0	0	n/a	1	0	0	3	1
Human Environment																
Est. Community Facilities Displaced within 500 ft of R/W (No.)*	n/a	0	n/a	n/a	0	2	3	2	2	n/a	n/a	3	0	1	0	n/a
Est. Population Density (Population/acre)	0.84	0.01	n/a	n/a	0.12	0.07	0.19	0.12	0.12	0.84	n/a	0.84	0.1	0.01	0.17	0.84
Est. Education Facilities within 500 ft of R/W (No.)	3	0	n/a	n/a	0	0	2	0	0	3	n/a	3	0	0	0	3
Est. Proposed/Modified Natchez Trace Parkway Crossing (No.)	n/a	0	n/a	n/a	1	1	1	1	1	n/a	n/a	0	1	1	1	n/a
Est. Parks within 500 ft of R/W (No.)	n/a	0	n/a	n/a	0	0	0	1	0	n/a	n/a	2	0	0	0	n/a
Natural Environment																
Est. Environmentally Sensitive Sites within 500 ft of R/W (No.)	1	0	n/a	n/a	1	0	0	0	0	1	n/a	1	0	1	0	1
Est. Perennial Streams Crossings (No.)	6	3	n/a	n/a	8	7	4	5	8	6	n/a	6	2	5	6	6
Est. Intermittent Streams Crossings (No.)	18	2	n/a	n/a	22	9	7	23	31	18	n/a	18	3	11	7	18
Est. Hydric Soils Impacts (Acres)	n/a	0.0	n/a	n/a	58.3	38.3	17.3	27.5	28.6	n/a	n/a	0	2.5	18.6	7	0
Est. Wetland Impacts (Acres)**	n/a	0.0	n/a	n/a	32.8	22.3	6.5	10.7	22.3	n/a	n/a	n/a	6.8	4.9	6.8	n/a
Est. 100-year Floodplain Encroachment (Acres)**	n/a	40.1	n/a	n/a	65.0	254.3	192.7	120.5	114.3	n/a	n/a	n/a	202.8	266.4	261.8	n/a
Physical Environment																
Est. Historical/Archeological Sites within 500 ft of R/W (No.)	6	0	n/a	n/a	0	1	4	1	1	6	n/a	6	4	5	1	6
Est. Public Water Supply Wells within 500 ft of R/W (No.)	1	0	n/a	n/a	0	0	1	2	1	1	n/a	1	0	0	0	1
Est. Potential Contamination Sites within 500 ft of R/W (No.)	31	3	n/a	n/a	1	6	3	2	3	31	n/a	31	1	0	3	31
Safety																
Est. Existing Grade Separations (No.)	5	5	5	5	1	2	1	1	1	5	5	5	2	1	2	5
Est. Existing Public At-grade Crossings to Remain (No.)	21	20	17	16	4	8	8	8	8	16	21	10	8	4	8	11
Est. Existing Public At-Grade Crossings Closed (No.)	n/a	2	6	7	17	15	15	13	13	5	0	11	14	17	14	11
Est. Proposed Grade Separations (No.)	n/a	2	3	6	9	4	6	7	8	5	2	11	9	9	7	11
Est. Proposed Public At-grade Crossings (No.)	n/a	0	0	0	21	8	7	19	23	0	0	0	0	20	0	0
Project Costs (\$2005)	n/a	\$70,700,000	\$63,983,000	\$110,119,000	\$577,780,000	\$367,790,000	\$328,730,000	\$583,730,000	\$747,230,000	CND [†]	CND [†]	\$558,150,000	\$504,450,000	\$670,130,000	\$516,490,000	\$333,450,000

Notes:
1. Quantities above have been estimated using GIS data and available mapping. Quantities should only be used for planning purposes.
2. * Community Facilities include Churches, Cemeteries and Recreational Facilities.
3. ** Wetlands and 100-year floodplain quantities includes all water body crossings. Proposed bridge structures would reduce or eliminate these impacts.
4. All alignment alternative lengths have been calculated from MP 575.5 to MP 600.0.
5. [†] Costs not determined due to unfeasibility of alternative
6. Bridge/Trestle length based on distance of stream crossings and 20% of distance of floodplain crossing.

Table 2-2 Alternative Evaluation Matrix

Alternative	Origin	Description	Length of New Track (miles)	Satisfies Purpose and Need	Issues	Estimated Cost (\$ Millions)	Brought Forward Into EIS
A	-	No-Build Alternative. Maintains the existing BNSF main line through Tupelo.	N/A	No	Does not solve any delays or provide any benefits.	\$0 (\$1,250 Congestion)	Yes ¹
Operational Improvement	Feasibility Study	Consists of moving BNSF-KCS interchange and switching yard to SE and constructing overpasses on Eason Blvd.	0.9	No	Does not remove trains from Crosstown. Can be integrated into other alternatives.	\$71	No
In-town Alternative Scenario 1	Feasibility Study	Grade separation at Crosstown. Elevates Gloster St. and Main St. over rail.	N/A	No	Potential impacts to historic structures and schools on Gloster St. and Main St. Doesn't provide same benefits as other alternatives.	\$64	No
In-town Alternative Scenario 2	Feasibility Study	Grade Separation at Crosstown. Elevates rail over Gloster St. and Main St.	N/A	No	Permanent road closures required. Impacts to several structures.	\$110	No
B	Feasibility Study	New Bypass Alternative. Western route located approximately 2 miles west of Coonewah Creek.	29.7	Yes	Long route in rural area. Must use existing track to serve customers. Crosses Natchez Trace Pkwy. at new location. New yard to the south.	\$578	No ²
C	Feasibility Study	New Bypass Alternative. Northern route located near Saltillo, then parallel to US 45.	16.4	No	Central alignment partially in urban area. Shares right-of-way with KCS. Crosses Natchez Trace Pkwy. in existing rail location. Requires operational improvements to the yard.	\$368	No
D	Feasibility Study	New Bypass Alternative. Northern route located north of Barnes Crossing then parallel to US 45.	14.0	Yes	Central alignment partially in urban area. Shares right-of-way with KCS. Crosses Natchez Trace Pkwy. in new location. Requires operational improvements to the yard.	\$329	No ²
E	Feasibility Study	New Bypass Alternative. Eastern route located near Saltillo, south along Tulip Creek and Garrett Creek.	24.9	Yes	Eastern alignment partially in urban area. Crosses Natchez Trace Pkwy. at New location. Requires new yard to the north.	\$584	No ²
F	Feasibility Study	New Bypass Alternative. Eastern route located near Saltillo, south along Boguefala Creek and Smith Creek.	29.8	Yes	Eastern alignment mostly in rural area. Crosses Natchez Trace Pkwy. at New location. Requires new yard to the north.	\$747	No ²
G	Scoping Meeting	Placing rail in trench through town.	N/A	No	Requires temporary rail corridor and yard to be below ground in floodplain. Significant drainage and safety issues with trench.	N/A	No
H	Scoping Meeting	Grade separation at Crosstown. Elevates Gloster St. over rail and includes second grade separated crossing to the south of Main St.	N/A	No	Potential impacts to historic structures and schools on Gloster St. and Main St. Doesn't provide same benefits as other alternatives.	N/A	No
I	Scoping Meeting	Elevated rail viaduct through town.	N/A	Yes	Uses existing Natchez Trace Pkwy. crossing. Requires right-of-way in urbanized area with many residential parcel and structure impacts and would create visual impacts. Eliminates whistles at intersections. Requires operational improvements to the yard.	\$558	No ³
J	Scoping Meeting	New Bypass Alternative. Parallels US 78 and US 45.	10.9	No	Crosses Natchez Trace Pkwy. at interchange with US 78. Crosses US 78, US 45, and Gloster St. in same proximity with high skew angle requiring three level interchanges. Requires operational improvements to the yard.	\$505	No
K	Alternative Refinement Meeting	New Bypass Alternative. Parallels Coonewah Creek.	26.8	Yes	Long route near urban area. Must use existing track to serve customers. Crosses Natchez Trace Pkwy. at new location. New yard to the south.	\$670	Yes
L	Alternative Refinement Meeting	New Bypass Alternative. Parallels Coley Road Extension and US 45.	11.9	Yes	Central alignment paralleling proposed roadway. Joint crossing with Natchez Trace Pkwy. Crosses US 78, Gloster St. and US 45 closer to perpendicular angle. Requires operational improvements to the yard.	\$517	Yes
M	Alternative Refinement Meeting	Elevated rail viaduct through town.	N/A	Yes	Similar to Alternative I, but uses more retaining walls and fill sections for the elevated rail. Viaduct to remain within existing right-of-way, but would have visual impacts to parcels.	\$333	Yes

1. No-Build Alternative required to be evaluated in alternatives analysis under NEPA Section 1502.14(d).

2. Feasibility Alternatives (B-F) were dismissed based on public, agency, and/or railroad concerns.

3. Alternative I dismissed due to property impacts and high potential for public controversy.

traffic detours during construction of the roadway bridge structure and the required utility relocations. This alternative could not be completed without adverse community and economic impacts to the public elementary school, businesses, and historic structures in downtown Tupelo. When viewed in light of the project's Purpose and Need Scenario 1 was eliminated from further consideration.

In-town Alternative Scenario 2: This alternative would require permanent roadway closures within central Tupelo, which would satisfy the safety and efficiency of railroad operations aspects of the Purpose and Need. However, while traffic at Crosstown would flow unimpeded by rail traffic, the traffic pattern would change and contribute higher traffic volumes elsewhere within the roadway network. The roadway closures would detract from the quality of life and impede emergency vehicles in the vicinity of the closures. Therefore, this alternative was eliminated from consideration. However, MDOT determined that if the limits of the elevated rail section were extended to avoid street closures, this could be considered a feasible option. This alternative was subsequently refined and is presented as Alternative I.

Alternative B: This alternative would require the crossing of 30 perennial or intermittent streams, affect over 90 acres of wetlands, and cross over 65 acres of 100-year floodplain. This alternative also had negative public sentiment from area residents who expressed opposition to a new railroad corridor through currently quiet lands. Alternative B traverses lands known to include possible Chickasaw settlements and has a construction cost over \$577 million. While this alternative would satisfy the project's Purpose and Need, it was eliminated from consideration due to high cost, large right-of-way requirements, poor public support, and the significant potential impacts to archeological sites, wetlands, and floodplains.

Alternative C: This alternative would cross over 254 acres of 100-year floodplain, although some of that acreage includes the shared corridor with the existing KCS rail line. This alternative would require a speed limit of 15 mph for an extremely sharp curve needed to merge with the KCS rail line, which would not satisfy the efficiency goal of the project's Purpose and Need. During the scoping meetings, the City of Saltillo expressed concern over the potential negative effects of increased rail traffic within their city limits. Both KCS and BNSF also expressed objection to sharing the rail corridor between Saltillo and US 78. This alternative was eliminated from further consideration during the scoping process due to limited speed potential, significant potential impacts to floodplains, and the disapproval of both the City of Saltillo and the railroads.

Alternative D: This alternative would require a new crossing of the Natchez Trace Parkway in close proximity to a residential development and a large retail center. The controlling grades required to grade separate the roadways from the railroad would make this crossing impractical. Alternative D would

cross over 197 acres of 100-year floodplain, although some of that acreage includes the shared corridor with the existing KCS rail line. Both KCS and BNSF also expressed objection to sharing the rail corridor between Saltillo and US 78. Without this crucial link in the alignment, Alternative D was eliminated from further consideration during the scoping process. However, with modifications, the alternative could satisfy the project's Purpose and Need, and subsequently was refined to reduce the potential environmental impacts and right-of-way requirements, and to eliminate the shared railroad corridor. This refined alternative is presented as Alternative J.

Alternative E: This alternative would cross 28 perennial and intermittent streams, affect over 38 acres of wetlands, and cross over 120 acres of 100-year floodplain. In addition, Alternative E would add over 10 miles to the BNSF operational distance. The alternative corridor would encroach on the Tombigbee State Park, run through the City of Saltillo, require a new crossing of the Natchez Trace Parkway, and cost over \$583 million to construct. Public sentiment for Alternative E was negative and the City of Saltillo expressed concern over the potential effects of increased rail traffic within their city limits. Despite the alternative's ability to satisfy the project's Purpose and Need, Alternative E was eliminated from further consideration during the scoping process due to high cost, extensive right-of-way requirements, significant impacts to wetlands and floodplains, and the disapproval of the City of Saltillo.

Alternative F: The easternmost alternative would cross 39 perennial and intermittent streams, affect over 40 acres of wetlands, and cross over 114 acres of floodplains. Alternative F would add almost 14 miles to the BNSF operational distance. The alternative corridor would run through the City of Saltillo, require a new crossing of the Natchez Trace Parkway, and cost over \$747 million to construct. Public sentiment for Alternative F was negative and the City of Saltillo expressed concern over the potential effects of increased rail traffic within their city limits. Despite the alternative's ability to satisfy the project's Purpose and Need, Alternative F was eliminated from further consideration during the scoping process due to high cost, extensive right-of-way requirements, significant impacts to wetlands and floodplains, and the disapproval of the City of Saltillo.

2.6.4.2 Scoping Alternatives

Alternative G: The construction cost of a trench is typically three times greater than that for an elevated rail viaduct. The depth of the rail trench for Alternative G would be approximately 35 feet below existing ground to provide sufficient vertical clearance under the existing roadways. The existing BNSF main line crosses five perennial streams between the Natchez Trace Parkway and Veterans Boulevard, including the floodway associated with King's Creek Tributary No. 1 and the floodway associated with both Town Creek and Mud Creek. The trench would tunnel underneath those

streams to maintain their channels and avoid flooding the trench. To maintain satisfactory profile grades for the BNSF main line, the trench would begin south of Lumpkin Avenue and extend south of Eason Boulevard, and would require the permanent closure of Veterans Boulevard. Several dozen residences and businesses would require relocation due to the right-of-way acquisition required to excavate and construct the trench. Four rail-served businesses would require relocation, including three with large physical plants. The trench would require fencing to restrict pedestrians and prevent objects from falling on the tracks, which would present a physical divide within the city. Within the City of Tupelo, the projected rail profile depth is anticipated to be below the existing groundwater table. If the rail is below the existing groundwater table, it may require measures to maintain positive drainage (e.g. pumping) to avoid the possibility of flooding the tracks. This is typically unacceptable to railroads due to the potential interruptions to railroad operations, which would not satisfy the efficiency of operations goal of the project's Purpose and Need. In addition, Alternative G would have a large impact on commercial freight needs in the area and could not be constructed without vast right-of-way acquisition in a dense urban residential and commercial area. The large amount of property impacts, a permanent road closure at Veterans Boulevard, significant groundwater elevation issues, and the failure of the alternative to satisfy the project's Purpose and Need all contributed to Alternative G being considered infeasible and eliminated from further consideration.

Alternative H: This alternative is not considered feasible or desirable to MDOT due to the adverse impacts to residences, businesses, and access to the historic properties north of Crosstown. The Gloster Street overpass would also restrict turning movements between Gloster Street and Main Street. Given the large quantity of adverse property and access impacts, this alternative would not satisfy the aspects of the project's Purpose and Need and was eliminated from further consideration.

Alternative I: Raising the BNSF main line would eliminate conflict between trains and vehicular traffic, reduce motorist delay, and create an opportunity for silencing of locomotive horns within the city. The rail line would not require extensive additional right-of-way as compared with other alternatives, but the right-of-way required contains a large number of residential and business structures within an urbanized area. This alternative would create public controversy and could increase anticipated right-of-way acquisition costs substantially. The right-of-way acquisition and possibility for public controversy associated with Alternative I would not satisfy the quality of life aspect of the project's Purpose and Need. Therefore, this alternative was eliminated from further consideration. However, this alternative was refined to remain within the existing BNSF right-of-way and to be constructed mostly on bridge structure with the limited use of retaining walls as Alternative M.

Alternative J: This alternative, refined from Alternative D, would reduce the right-of-way requirements and shorten the length of new railroad by nearly 2.5 miles as compared to Alternative D. This alternative would also reduce the wetland impacts to just over 9 acres, as compared to Alternative D's 24 acres. However, Alternative J would cross over 202 acres of 100-year floodplain, an increase of over 10 acres when compared to Alternative D. The proposed alignment was deemed impractical because it would cross the Natchez Trace Parkway at the US 78 interchange, forcing either permanent closure of a portion of the interchange or construction of flyover ramps, which would not only increase construction cost, but would detract from the aesthetics of the Natchez Trace Parkway. The impact on this interchange rendered this alternative infeasible because it would not satisfy the traffic, emergency services, or quality of life aspects of the project's Purpose and Need. Thus, Alternative J was eliminated from further consideration.

Alternative K: This alternative was refined from Alternative B to bring the alignment closer to the City of Tupelo in order to reduce the length of new track and potential environmental impacts. Alternative K would cross over 266 acres of 100-year floodplain, 16 perennial or intermittent streams, and 23 acres of wetlands. Alternative K would add approximately 2 miles of BNSF operational distance, but would include a new crossing of the Natchez Trace Parkway. This alternative would adequately satisfy the project's Purpose and Need, although it has a potential for public controversy and impact to cultural resources. This alternative was brought forward for further consideration based on the desire to have a corridor bypass alternative around each side of Tupelo.

Alternative L: This alternative was refined from Alternative J to avoid the Natchez Trace Parkway interchange with US 78. The alignment parallels the proposed Coley Road Extension to reduce the impacts to developed land and cross the Natchez Trace Parkway at the same location as the proposed Coley Road Extension. This alternative would cross over 262 acres of 100-year floodplain, 13 perennial or intermittent streams, and approximately 13 acres of wetlands. Alternative L would add approximately 2.3 miles to the BNSF operational distance and would not add an additional crossing of the Natchez trace Parkway, beyond a previously planned improvement. Alternative L adequately satisfies the project's Purpose and Need and was brought forward for further consideration.

Alternative M: Alternative M would provide the desired results as stated in Alternative I without the additional right-of-way acquisition and a reduced possibility for public controversy. In addition, the refinements result in a lower construction cost than Alternative I, increasing the attractiveness of the elevated rail viaduct as a feasible alternative. With the reduction of the right-of-way impacts and reduced project costs, this alternative adequately satisfied the project's Purpose and Need. This alternative was brought forward for further consideration.

2.6.4.3 Alternatives Screening Conclusion

Alternatives A, K, L, and M were considered for future study and were also further examined for refinements to reduce the potential environmental, cultural, traffic, and right-of-way impacts.

2.7 REFINED ALTERNATIVES

These alternatives were discussed with BNSF, KCS, federal, state and local government agencies, and the community for additional input.

2.7.1 Railroad Coordination Meeting

The study team met with MDOT, FRA, BNSF, and KCS representatives in Jackson, Mississippi on April 10, 2007 to discuss the alternatives suggested at the scoping meeting. Advantages and disadvantages for Alternatives A, K, L, and M were compared. In general, BNSF had concerns about new at-grade road crossings.

At this meeting, it was determined that all of the alternatives considered would implement the relocated interchange as described in the Operational Improvement in **Section 2.2.1**. The following is a summary of the advantages and disadvantages of Alternatives A, K, L, and M:

Alternative A (No-Build)

The advantages of this alternative are as follows:

- Would not impede automobile or train traffic flow during construction.
- Would not require expenditure of funds for right-of-way acquisition, engineering, design or construction.
- Would not result in additional impact on the adjacent natural, physical, and human environments.
- Would not result in disruption to existing land uses due to construction-related activities.

The disadvantages of this alternative are as follows:

- Would not satisfy the project Purpose and Need.
- Would not result in reduction in traffic delay.
- Could increase the emergency service response time due to increased congestion.
- Would not decrease train horn soundings or train noise.
- Would not improve freight rail operations.
- Could increase the evacuation time during emergency situations due to increase in safety-related accidents.

Alternative K

The advantages of this alternative are as follows:

- Would remove through trains from central Tupelo.
- Would reduce vehicular conflict at at-grade crossings.

- Would have a high potential for rail-served industrial development.
- Would eliminate the traffic delay created by the BNSF-KCS interchange.

The disadvantages of this alternative are as follows:

- Would require a new at-grade crossing of the KCS rail line.
- Would increase railroad operational mileage.
- Would require the existing BNSF main line from US 45 to remain as a spur to access interchange with KCS.
- Would have profile grade issues immediately south of Sherman.
- Could present public controversy.
- Would have a large number of new roadway crossings.

Alternative L

The advantages of this alternative are as follows:

- Would remove through trains from central Tupelo.
- Would use a shared corridor with proposed roadway.
- Would eliminate the BNSF-KCS at-grade railroad crossing.
- Would eliminate the vehicular traffic delay created by the BNSF-KCS interchange.
- Would have less track construction than any of the initial alternatives.
- Would have support of the U.S. National Park Service.

The disadvantages of this alternative are as follows:

- Would increase railroad operational mileage.
- Would have a limited potential for rail-served industrial development.
- Would have a number of new roadway crossings.
- Would have engineering challenges between Natchez Trace Parkway and Main Street.
- Could present public controversy.

Alternative M

The advantages of this alternative are as follows:

- Would eliminate at-grade crossings within central Tupelo.
- Would create a “quiet zone” through Tupelo.
- Would require minimal right-of-way.
- Would improve rail speed through Tupelo.
- Could minimize public controversy.
- Would not increase railroad operational mileage.
- Could include a multi-use trail.

The disadvantages of this alternative are as follows:

- Would not promote rail-served industrial development.
- Would result in visual and vibration impacts on adjacent residences and businesses.
- Would create maintenance and liability issues (BNSF would request MDOT to bear the responsibility of maintaining the elevated structure through Tupelo).

2.7.2 City of Tupelo Meeting

A meeting was held on June 11, 2007 with the Mayor and City of Tupelo staff. The purpose of the meeting was to update them on the status for this project and the Coley Road Extension. Alternative L, which would parallel the Coley Road Extension, could adversely impact the development along the roadway. The refined alternatives were discussed. Based on the information presented, the Mayor stated that Alternative M of elevating the rail was preferred by the City staff.

2.7.3 Thoroughfare Committee Meeting

A meeting was held on June 11, 2007 with the Thoroughfare Committee. The purpose of the meeting was to update them on the status of the project and present the EIS alternatives. The Committee was not in favor of the railroad being parallel to the Coley Road Extension (Alternative L), since the future land use would not be compatible with railroad uses. Alternative M, the elevated rail with aesthetic treatments, was preferred by the Thoroughfare Committee.

2.7.4 Public Meeting

An Alternatives Public Meeting was held on July 12, 2007. The meeting was conducted to afford the public the opportunity to express their views concerning the various alternatives. The meeting was held at the BancorpSouth Convention Center in Tupelo. In preparation for this meeting, notification mailings were sent to property owners, local elected officials, and other interested parties. In addition, standard advertisements, press releases and articles were published in the Northeast Daily Journal. The meeting format was an informal, open house to encourage the exchange of information between the public and the project team. Project information and comments cards were available to attendees. Representatives from MDOT and project team were available to speak with the public and answer questions.

A total of 30 written comment cards were received at the meeting. In many cases, individuals attending the meeting had multiple opinions regarding the project. Therefore, the number of comments given does not match the number of comment cards. The comments received are briefly summarized in **Table 2-3**. Copies of comments are located in the project files and summarized in the *Public Meeting #2 Summary* (ABMB, August 2007).

Table 2-3 Summary of Public Comments

Corridor Alternative	# of Comments Expressing Preference	# of Comments Expressing Opposition
Alternative A (No-Build)	5	0
Alternative K	3	3
Alternative L	3	2
Alternative M	22	2
Other	2	-

2.7.5 Alternative L Refinements

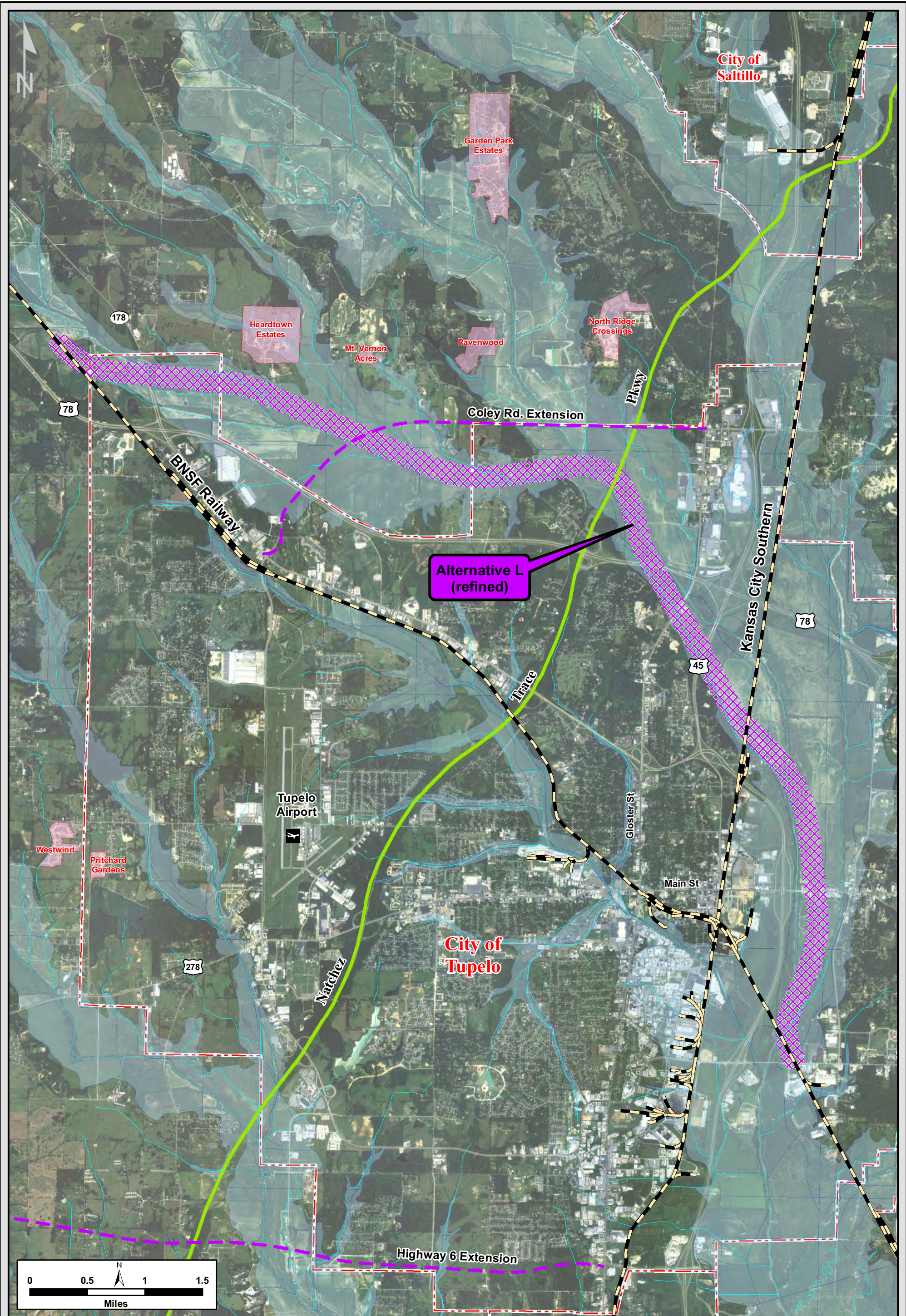
As a result of the feedback from the Alternatives Public Meeting, Alternative L was investigated further by project consultants to MDOT at the request of MDOT. The predominant issue with Alternative L, shown on **Figure 2-12**, is the effect that the alternative would have on the developing property along the proposed Coley Road Extension. The alternative was originally developed to share the proposed crossing of the Natchez Trace Parkway. However, the City of Tupelo and the Thoroughfare Committee opposed the rail alignment due to its proximity to the Coley Road Extension and the negative influence the rail could have on the development of the adjacent properties. Alternative L was then refined to cross the proposed Coley Road Extension and run parallel to Town Creek, which would require a new crossing of the Natchez Trace Parkway just north of Town Creek, and then turn south across the Natchez Trace Parkway north of the interchange with US 78. The refined Alternative L, shown on **Figure 2-14**, would continue south, as described previously, to intersect with the existing BNSF main line just north of Eason Boulevard.

The advantages of the refined Alternative L are as follows:

- Would remove through trains from central Tupelo;
- Would allow the existing Natchez Trace Parkway / US 78 interchange to remain;
- Would allow the properties along the proposed Coley Road Extension to develop unimpeded;
- Would eliminate the BNSF-KCS at-grade railroad crossing; and
- Would result in the least track to build than any of the other bypass alternatives.

The disadvantages of the refined Alternative L are as follows:

- Would increase railroad operational mileage;
- Would result in a limited potential for rail-served industrial development;
- Would require new at-grade roadway crossings;
- Would require much of the alignment to be built on either bridge or trestle;
- Would require a new crossing of the Natchez Trace Parkway; and
- Could present public controversy.



Alternative L
(refined)



LEGEND	
	Railroad
	City Boundary
	Natchez Trace Pkwy
	Subdivision
	River / Stream
	FEMA Floodplain

Tupelo Mississippi Railroad Relocation
Planning & Environmental Study

Alternative L
(refined)
Figure
2-14

2.7.6 Native American Resource Impacts

As discussed in **Section 2.5**, the Chickasaw are known to have buried their dead underneath their houses, so the disturbance of any Chickasaw village could mean the potential disturbance of a burial site. Since the majority of these village sites are not specifically identified, it is assumed that any new corridor or construction to the south and west of Tupelo could have a high probability of disturbance of a Chickasaw burial ground.

Alternative K runs south of and roughly parallel to Coonewah Creek, through areas which were known to be inhabited by the Chickasaw in the 17th and 18th Centuries. Alternative K would, therefore, have a significant potential for disturbance of Chickasaw burial sites.

Alternative L runs north of and roughly parallel to Town Creek, which are lands that were not known to be inhabited by the Chickasaw. Alternative L would have a lower potential for disruption of Chickasaw burial sites.

Alternative M runs roughly parallel to and north of Kings Creek through the existing BNSF right-of-way. The existing BNSF right-of-way is outside of the known Chickasaw settlement areas and is already developed. Therefore, Alternative M would have a low potential for disruption of Chickasaw burial sites and would result in the least disruption potential of the three refined alternatives.

2.7.7 Refined Alternatives Analysis

Following the Alternatives Public Meeting, Alternative A (No-Build), Alternative K, Alternative L, and Alternative M were reexamined using the same evaluation criteria as outlined in **Section 2.6.1** of this report. The anticipated impacts for each alternative are summarized in **Table 2-4**.

2.7.8 Refined Alternatives Screening

The impact summaries for each Alternative were compared with the project's Purpose and Need to determine which alternatives would be further evaluated in the next phase. **Table 2-5** provides a brief description of each alternative.

Alternative K: This alternative would satisfy the project's Purpose and Need but would have potential for significant impacts to Native American resources as well as impacts to over 23 acres of wetlands and over 266 acres of 100-year floodplain. Alternative K would also require the most right-of-way acquisition of the three refined build alternatives, which would lead to public controversy. This alternative lacks support from BNSF and KCS because of additional operating distance and the BNSF-KCS crossing remaining at-grade.

Alternative K also lacks support from other public agencies because it would require a new crossing of the Natchez Trace Parkway and would have a high potential for disruption of Chickasaw burial sites. Therefore, this alternative was eliminated from further consideration.

Table 2-4 Refined Alternatives Evaluation Measures

Evaluation Measures	No Build Alternative A	Alternative K	Alternative L (Refined)	Alternative M
Alignment Statistics				
Est. Length (Miles)	24.5	26.8	26.8	24.5
Est. Length of New Track Construction (Miles)	n/a	26.8	12.5	3.0
Est. Length of Existing BNSF Track (Miles)	24.5	0.0	14.9	21.5
Est. Length of Existing KCS Track (Miles)	n/a	0.0	0.0	0.0
Est. Additional BNSF Operational Distance (Miles)	n/a	2.3	2.3	0.0
Est. Additional KCS Operational Distance (Miles)	n/a	10.4	0.9	0.0
Est. Proposed Total Bridge/Trestle Length (Feet)	n/a	13,880	19,710	7,200
Est. Proposed Highway Overpass Modifications (No.)	n/a	0	1	1
Human Environment				
Est. Community Facilities Displaced within 500 ft of R/W (No.)*	n/a	1	0	n/a
Est. Population Density (Population/acre)	0.84	0.01	0.15	0.84
Est. Education Facilities within 500 ft of R/W (No.)	3	0	0	3
Est. Proposed/Modified Natchez Trace Parkway Crossing (No.)	n/a	1	1	n/a
Est. Parks within 500 ft of R/W (No.)	n/a	0	0	n/a
Natural Environment				
Est. Environmentally Sensitive Sites within 500 ft of R/W (No.)	1	1	0	1
Est. Perennial Streams Crossings (No.)	6	5	5	6
Est. Intermittent Streams Crossings (No.)	18	11	3	18
Est. Hydric Soils Impacts (Acres)	n/a	18.6	7.0	n/a
Est. Wetland Impacts (Acres)**	n/a	4.9	1.9	n/a
Est. 100-year Floodplain Encroachment (Acres)**	n/a	266.4	242.7	n/a
Physical Environment				
Est. Historical/Archeological Sites within 500 ft of R/W (No.)	6	5	4	6
Est. Public Water Supply Wells within 500 ft of R/W (No.)	1	0	0	1
Est. Potential Contamination Sites within 500 ft of R/W (No.)	31	0	3	31
Safety				
Est. Total Grade Separations (No.)	5	9	8	16
Est. Total At-grade Crossings (No.)	51	38	53	40
Project Costs (\$2005)	n/a	\$670,130,000	\$769,140,000	\$333,450,000

Notes:

- Quantities above have been estimated using GIS data and available mapping. Quantities should only be used for planning purposes.
- * Community Facilities include Churches, Cemeteries and Recreational Facilities.
- ** Wetlands and 100-year floodplain quantities includes all water body crossings. Proposed bridge structures would reduce or eliminate these impacts.
- All alignment alternative lengths have been calculated from MP 575.5 to MP 600.0.

Table 2-5 Refined Alternatives Evaluation Matrix

Alternative	A	K	L	M
Description	No Build Alternative. Maintains the Existing BNSF Rail Line through Tupelo.	New Bypass Alternative. Parallels Coonewah Creek.	New Bypass Alternative. Parallels Town Creek and Mud Creek.	In-Town Alternative - Elevating Rail Through Town.
Length of New Track (miles)	N/A	26.8	11.6	0.9
Issues	Does not solve any delays or provide any benefits.	Long route near urban area. Must use existing track to serve customers. Crosses Trace at new location. New yard to south. Impacts to cultural resources. Railroad and Agency opposition.	New crossing with Trace. Crosses US 78, Gloster and US 45 closer to perpendicular angle. 70% of alignment on trestle. Requires operational improvements to yard.	Similar to Alternative I, but uses more retaining walls and fill sections for the elevated rail.
Satisfies Project Purpose and Need	No	Yes	Yes	Yes
Estimated Cost (\$ Millions)	\$0 (\$1,250 Congestion)	\$670	\$769	\$333
Moving Forward	Yes ¹	No	Yes	Yes

1. No-Build Alternative required to be evaluated in alternatives analysis under NEPA sections 1502.14(d) & 1508.25(b)

Alternative L: This refined alignment would affect over 242 acres of 100-year floodplain and nearly nine acres of wetlands. Alternative L has some support from BNSF, KCS, and other public agencies because it would require a nominal increase in BNSF operational mileage and does not run through culturally sensitive lands. However, other public agencies oppose this alternative because it would require a new crossing of the Natchez Trace Parkway. In addition, it has an estimated construction cost of over \$769 million, the highest construction cost of any of the refined alternatives. Alternative L's construction cost is estimated to be 15% higher than Alternative K and 131% higher than Alternative M. However, this alternative does satisfy the aspects of the project's Purpose and Need while minimizing the effects on the community and development. Despite the high cost, this alternative corridor was brought forward for further consideration.

Alternative M: Alternative M satisfies the aspects of the project's Purpose and Need, has the most support from the public, the railroads, and the public agencies, would result in the least environmental (wetlands and floodplains) and cultural impacts, and is estimated to have the lowest construction cost of the build alternatives. This alternative was brought forward for further consideration.

2.7.9 Refined Alternatives Conclusion

Based upon the responses from public and agency meetings, the alternatives to be carried forward for further evaluation are Alternative A (No-Build), Alternative L (Refined Coley Road) and Alternative M (Elevated Rail).

2.8 REASONABLE ALTERNATIVES

Alternatives A, L, and M were identified as the reasonable alternatives for detailed evaluation. Specific railway corridors, using BNSF standards for track construction, were developed to identify, quantify, and mitigate to the fullest extent practicable some of the potential impacts. Detailed environmental, social, cultural, and physical investigations were conducted based on the results from database searches, field investigations, and GIS analysis for each of the three reasonable alternatives. These investigations were performed to identify a more detailed concept for each alternative.

2.8.1 Reasonable Alternatives Descriptions

Alternative A (No-Build)

This alternative would have the existing alignment for BNSF main line remain in its existing condition, without any rail or automobile improvements. The existing yard and interchange with the KCS rail line would also remain.

Alternative L

This alternative, shown on **Figure 2-14**, would depart the existing BNSF main line north of US 78, cross over MS 178 and Town Creek, then turn to parallel Town Creek, crossing under the Coley Road Extension. The alignment would cross over the Natchez Trace Parkway and would then turn south, to cross over US 78, Gloster Street, and US 45. It would then cross over the KCS rail line, continue south, cross over Main Street, and merge with the BNSF main line. Approximately 11.6 miles of

new track would be constructed for Alternative L, with an additional 0.9 miles of track for the interchange with the KCS rail line, as described in the operational improvement in **Section 2.2.1** of this report. Approximately 14.9 miles of existing track would not require additional improvements. The length of rail bridges and trestle required to span floodplains and other water features would be approximately 19,710 feet.

Alternative M

Alternative M, shown on **Figure 2-15**, consists of an elevated rail viaduct with retaining walls and bridges within the existing railroad right-of-way. The rail would then be placed on earthen fill for the limits of the retaining wall. The route would parallel the existing track, except where modified curvature would allow trains to travel at 40 mph. Approximately 2.8 miles of elevated track would be constructed for Alternative M, with an additional 0.9 miles of track for the rail interchange, as described in the operational improvement in **Section 2.2.1** of this report. Approximately 21.7 miles of existing track would not require additional improvements. The length of rail bridges and trestle required to span floodplains, roadways, neighborhoods, and streams would be approximately 8,386 feet.

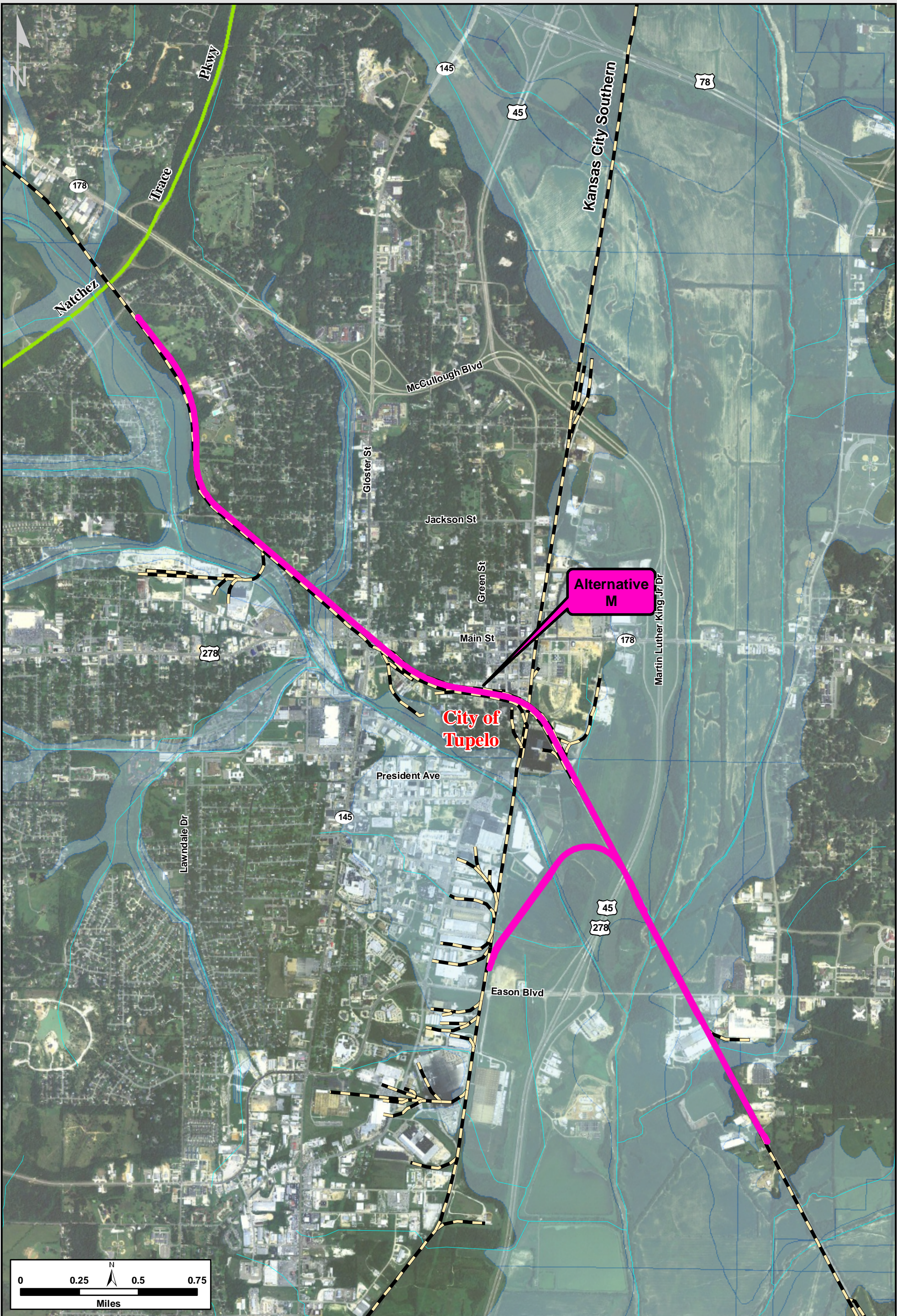
2.8.2 Reasonable Alternatives Analysis

Technical memoranda were prepared to outline the various potential impacts to the Tupelo area by the No-Build Alternative (Alternative A), and the Build Alternatives (Alternatives L and M). The findings of the technical memoranda are summarized in **Table 2-6** and the topics covered are summarized in this section and described in further detail in **Chapter 4**.

Archaeological & Cultural Sites

The investigations of Alternatives L and M involved database searches to document the previously recorded archaeological and historic sites and field investigations to determine the amount of archaeological or historic material within each affected site by shovel tests. The specific alignment for Alternative L was refined after the Alternatives Public Meeting to avoid as many impacts to known archaeological and historic sites as possible, while maintaining BNSF standards for rail alignment geometry at the design speed of 60 mph. The archaeological and cultural site investigations were documented in the *Cultural Resources Investigations for the Tupelo Railroad Relocation Study* (Brockington, January 2009) (CRS) which was forwarded to the State Historic Preservation Office (SHPO) for comment. In a letter dated March 17, 2009, included in **Appendix A**, the SHPO made several conclusions regarding the two reasonable build alternatives.

Alternative L would disturb five previously recorded archaeological sites, all located in farmland north of Town Creek between MS 178 and Mount Vernon Road. While none of these sites are listed on the National Register of Historic Places (NRHP), they do have the potential for cultural material and could be eligible for listing. The SHPO determined that construction of Alternative L had the potential to physically adversely affect three NRHP-eligible sites and intensive surveys would likely identify additional NRHP-eligible archaeological resources.








	LEGEND	Tupelo Mississippi Railroad Relocation Planning & Environmental Study	Alternative M
	<ul style="list-style-type: none"> Railroad Natchez Trace Pkwy River / Stream FEMA Floodplain		Figure 2-15

Table 2-6 Reasonable Alternatives Evaluation Measures

Evaluation Measures	No Build Alternative A	Alternative L	Alternative M
Alignment Statistics			
Est. Length (Miles)	24.5	26.8	24.5
Est. Length of New Track Construction (Miles)	n/a	12.5	3.7
Est. Length of Existing BNSF Track (Miles)	24.5	14.9	22.8
Est. Length of Existing KCS Track (Miles)	n/a	0.0	n/a
Est. Additional BNSF Operational Distance (Miles)	n/a	2.3	0.0
Est. Additional KCS Operational Distance (Miles)	n/a	0.9	0.9
Est. Proposed Total Bridge/Trestle Length (Feet)	n/a	19,710	8,386
Est. Proposed Highway Overpass Modifications (No.)	n/a	1	1
Archaeological & Cultural Sites			
Impacted Archeological/Historic Sites within 500 ft of R/W (No.)	n/a	5	4*
Endangered Species			
Encountered Species within 500 ft of R/W (No.)	n/a	0**	0
Floodplains and Floodways			
Est. 100yr Floodplain Encroachment (Acres)	n/a	186	10
Est. Regulatory Floodway Encroachment (Acres)	n/a	47	2
Socioeconomic			
Neighborhood Associations within 500 ft of R/W (No.)	4	2	4
Schools within 500 ft of R/W (No.)	2	1	2
Parks within 500 ft of R/W (No.)	4	1	4
Percent of Minority Households within 500 ft of R/W	14%	19%	14%
Percent of Low Income Households within 500 ft of R/W	17%	15%	17%
Visual Impacts to Residential or Historic Districts	No	No	Yes
Land Area with 0.5 miles of R/W (Acres)	6,888	8,160	6,888
Topography and Soils			
Area of High Shrink-Swell Potential Soils (Acres)	n/a	69.6	5.1
Wetlands			
Est. Wetland Impacts (Acres)	n/a	0.97	0.68
Impacted Stream Length (Feet)	n/a	2,230	350
Est. Prior Converted Cropland Impacts (Acres)	n/a	115	8
Safety			
Est. Total Grade Separations (No.)	5	15	16
Est. Total At-grade Crossings (No.)	51	38	40
Project Costs (\$2005)	n/a	\$769,140,000	\$333,450,000

Notes:

1. Quantities above have been estimated using GIS data, available mapping, and field visits. Quantities should only be used for planning purposes.
2. * Impacts are only to the surrounding viewshed to these sites.
3. ** No species encountered. However, suitable habitat exists for Price's Potato Bean in R/W.
4. All alignment alternative lengths have been calculated from MP 575.5 to MP 600.0.

The SHPO also determined that Alternative M would not physically disturb any previously recorded NRHP-eligible archaeological sites and additional archaeological resources would unlikely be encountered during construction. SHPO determined, however, that four historic districts and 34 architectural resources documented in the CRS were either NRHP-listed or NRHP-eligible and would be adversely affected by Alternative M's visual impacts. None of these architectural resources would be physically impacted by Alternative M, and the visual impacts could be mitigated through aesthetic design or other measures.

Construction Impacts

Potential construction impacts include public safety, economic, emergency service, water quality, noise, vibration, and traffic impacts. The alignment of Alternative L would be located away from most residential, public, and business structures, so the construction impacts would be minimal and mostly limited to traffic delay. The impacts anticipated with the construction of Alternative M would be the noise and

vibration associated with the pile driving near existing structures. However, these impacts would be mitigated and would not result in any permanent damage.

Endangered Species

Habitat of any endangered plant or animal species that would either be found or likely to be found within the alternative alignments was evaluated. The only federal or state listed endangered or threatened species which has been known to inhabit portions of either alternative is the Price's potato bean, a threatened plant species. The alignment for Alternative L runs through a suitable habitat for the plant, although no Price's potato bean blooms were found within the alignment corridor. Alternative M runs through the existing BNSF right-of-way, which is not a suitable habitat for the plant, and no blooms were found along the alignment.

Floodplains

Each of the reasonable alternatives was compared in detail for the right-of-way that would cross the 100-year floodplain and regulatory floodways as designated by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) map data (effective October 20, 1999). In addition to the acreage of affected floodplain and floodway, each alternative was compared for the effects from the size and location of bridge structures.

Alternative L not only crosses approximately 186 acres of 100-year floodplain, but it also runs within and parallel to a regulatory floodway for almost three miles of its alignment. Even though the proposed railroad would be constructed on either bridge or trestle over most of the floodplain, Alternative L would have a high potential for impacts to both the 100-year floodplain and the designated floodways, which would make a no-rise certification difficult to obtain.

Alternative M would cross approximately 10 acres 100-year floodplain and would only perpendicularly cross three regulatory floodways, two of which are already crossed by the existing BNSF main line.

Natural Ecological Systems

The natural animal and vegetative habitats within the alternative alignments were evaluated. The investigation performed included review of aerial photographs, known habitats and field investigation. The conclusion of this investigation is that Alternative L would have permanent adverse impacts to natural ecosystems due to the proximity of the alignment to existing water bodies. Alternative M would have temporary adverse impacts during construction, but beneficial impacts in reduced animal/train collisions and more space for animals to cross the rail corridor.

Natural Resources

The amount of natural resources (e.g. fuel, raw materials) consumed or disturbed by the construction of each alternative was evaluated. Alternative L would use more natural resources than Alternative M because of the significantly longer physical improvements needed.

Permit Requirements

Preliminary estimates of all the environmental and regulatory permits required for each alternative were developed. Each alternative would require a Section 404 permit from the USACE and a Stormwater Pollution Prevention Plan. The permits are discussed in greater detail in **Chapter 4**.

Public Safety

The automobile vs. train accident histories at each of the at-grade crossings of both the BNSF and KCS railways through Tupelo within the last 30 years were evaluated. In total, 49 accidents (including eight involving trains carrying hazardous materials) were recorded through downtown Tupelo on the BNSF and KCS railways. With the removal of at-grade crossings through Tupelo, both Alternative L and Alternative M would decrease the likelihood of auto/train accidents on the BNSF main line and the KCS rail line.

Socioeconomics

The evaluation considered each alternative's effect on demographics, industry and commerce, education, tourism, housing, and recreation. The investigation used census data, planning documents, local school districts, U.S. Department of Housing and Urban Development (HUD) housing information, and local interviews to compare the various impacts of each of the alternatives. Alternative L was found to have fewer impacts to schools, parks, and neighborhoods than Alternative M. However, Alternative L would have more impacts to minority households and adjacent land area.

Topography and Soils

The GIS data and field investigation of the soils for each alternative were evaluated. The investigation revealed that the soils for the majority of Alternative L have high shrink-swell potential, which means that the soils have low suitability for bridge or trestle support. Because the trestle and bridge length required for Alternative L to span the 100-year floodplain and regulatory floodways is significantly longer than a typical railroad corridor crossing, this would significantly increase the construction cost. The soil excavation would include removal of unsuitable soil and replacement with suitable fill material which could increase the impacts to the floodplain and floodways and require additional permit coordination. In addition, Alternative L would impact an area designated by the National Resources Conservation Service (NRCS) through Form AD-1006 as prime and unique farmland. Alternative M crosses soils with low shrink-swell potential and, therefore, would provide better suitability for bridge and elevated rail support.

Water Quality

Water quality in the study area was determined using database information, GIS data, topographical map review, and field investigation. The Mississippi Department of Environmental Quality (MSDEQ) has prepared a 303(d) list of impaired water bodies, which details the state's water bodies that do not meet their designated use. According to the MSDEQ, Town Creek, Mud Creek, and Kings Creek are all listed

on the impaired water bodies list due to their relative inability to satisfy their designated use for aquatic life.

Alternative L would closely parallel Town Creek along its entire length and also would run parallel to Mud Creek for approximately two miles. The proximity of the railroad could lead to additional siltation of these streams that could affect the ability of these streams to recover. Alternative L could hinder the potential of these streams to be removed from the impaired list. In addition, Alternative L would encroach on the Town Creek Master Water Management District's easements and would impede the maintenance of the floodway to Town Creek by restricting access and possibly altering the channel.

Since Alternative M would lie within the existing railroad right-of-way, it would have much less impact to the surrounding streams. The impacts would be limited to bridge widening and a new crossing of Kings Creek for the BNSF-KCS interchange.

Wetlands

The investigation of potential wetland impacts included information gathered from USFWS National Wetland Inventory (NWI) maps, NRCS soil maps, Mississippi Automated Response Information System (MARIS) data, aerial photographs, and field investigation. The alternatives were designed to avoid impacts to wetland areas, wherever possible. Wetland areas were measured as designated wetlands, stream crossings, and prior converted cropland. Alternative L would impact more designated wetlands, prior converted cropland, and linear feet of streams than Alternative M.

2.8.3 Agency Coordination

The two reasonable build alternatives (Alternatives L and M) were sent to the railroads and to the U.S. National Park Service (NPS) for review. In a letter dated July 16, 2007, the NPS expressed preference for Alternative M due to the least impacts to the Natchez Trace Parkway (no new crossing) and its viewshed. In a letter dated November 16, 2007, included in **Appendix A**, BNSF expressed preference for the "railroad fly-over option" (Alternative M) over the other alternatives and gave a list of comments and requirements for the conceptual design. In a meeting held in Tupelo, MS on September 10, 2008, KCS representatives reviewed both alternatives and stated that KCS held usage rights for the BNSF main line between Tupelo and New Albany, Mississippi and that any design would have to accommodate the ability of northbound KCS trains to access the northbound BNSF main line. KCS expressed that, as presented, neither build alternative would allow that operation, but added that the addition of a wye to the relocated interchange for Alternative M and the addition of a wye just south of the US 45 overpass to the new corridor for Alternative L would allow the reasonable build alternatives to satisfy the usage rights.

2.8.4 Reasonable Alternatives Screening

Upon review of the technical memoranda, the impact summaries for each alternative were evaluated and compared to the aspects of the project's Purpose and Need to determine which alternatives would be brought forward as design alternatives. **Table 2-7** provides a brief description of each alternative.

Table 2-7 Reasonable Alternatives Evaluation Matrix

Alternative	A	L	M
Description	No Build Alternative. Maintains the Existing BNSF Rail Line through Tupelo.	New Bypass Alternative. Parallels Town Creek and Mud Creek.	In-Town Alternative - Elevating Rail Through Town.
Length of New Track (miles)	N/A	12.5	3.7
Issues	Does not solve any delays or provide any benefits.	New crossing with Trace. 70% of alignment on trestle. More Floodplain, Wetlands, and Water Quality Impacts. Higher Cost. Requires operational improvements to yard.	Visual Impacts to historic districts and residential neighborhoods due to retaining walls, bridges, and fill sections for the elevated rail.
Estimated Cost (\$ Millions)	\$0 (\$1,250 Congestion)	\$769	\$333
Satisfies Goals of Project Purpose and Need	No	No	Yes
Moving Forward Into EIS	Yes ¹	No	Yes

1. Alternative required to be evaluated in alternatives analysis under NEPA sections 1502.14(d) & 1508.25(b).

Alternative L: Alternative L has unsuitable soils for bridge and trestle construction for approximately 70% of the new corridor's alignment, which would present significant design and permitting challenges. It would also cross over 186 acres of 100-year floodplain and would encroach on nearly three miles of regulatory floodways. These design and permitting issues could increase the construction cost beyond the current estimate and could lengthen the project construction schedule. This alternative would adversely impact 0.97 acres of wetlands, 2,230 feet of streams, and five previously recorded archaeological sites. In addition, a large amount of natural resources, natural ecosystems, and potential endangered plant species habitat would be disturbed with the construction of this alternative. Alternative L would also hinder the ability to improve the water quality of Town Creek and Mud Creek and have those streams removed from the 303 (d) impaired water body list.

This alternative also had opposition from local residents, BNSF, KCS, the Natchez Trace Parkway, and the City of Tupelo, which each expressed concern regarding the impacts a new railroad corridor would have on adjacent property, aesthetics, and the environment.

When evaluated in light of the project's Purpose and Need, Alternative L appears to satisfy the aspects of reduced traffic delay, improved emergency response, improved safety, and enhanced quality of life. However, given the alignment's proportion of bridge and/or trestle structure and additional operating length (especially for interchange operations), improving efficiency of railroad operations would not be satisfied, and Alternative L would hinder the growth of rail-served development.

While some of these impacts and challenges could be mitigated, the combination of the adverse impacts along with the preliminary construction cost estimate being 131% higher than the cost for Alternative M, a new crossing of the Natchez Trace Parkway, and the lack of public, railroad, and agency support, Alternative L was determined to be infeasible. Therefore, Alternative L was eliminated from further consideration.

Alternative M: Despite the potential visual impacts to neighborhoods, historic districts, and historic properties, Alternative M would have no physical impacts to archaeological sites or potential endangered plant species habitat. Alternative M would have fewer impacts to wetlands, streams, floodplains, regulatory floodways, natural resources, natural ecosystems, and the water quality of Town Creek and Mud Creek than Alternative L. Alternative M satisfies the project's Purpose and Need, while providing the greatest efficiency to railroad operations and rail-served development. Alternative M could be constructed at a significantly lower cost than Alternative L, has support from local and state agencies, the railroads, and the citizens of Tupelo and Lee County. This alternative was brought forward for further consideration as the Build Alternative.

2.9 DESIGN ALTERNATIVES

The EIS alternatives process summarizes the development, refinement, comparison, and screening of various alternatives for the proposed Tupelo Railroad Relocation Project. The study relied on use of the best information available to evaluate and screen dozens of miles of possible rail routes, roadway improvements, and elevated rail. The activities included completing preliminary engineering and evaluating more than 160 miles of new rail. The alternative development process resulted in a design alternative that meets the project's Purpose and Need, is feasible and practical, and generally addresses agency and stakeholder concerns. The No-Build Alternative (Alternative A) and the Build Alternative (Alternative M) are the alternatives studied in detail in this EIS.

2.9.1 No Build Alternative

This alternative would have the existing alignment for BNSF remain in its existing condition, without any railroad or roadway improvements. The existing BNSF-KCS interchange and storage yards would also remain.

2.9.2 Build Alternative

This alternative, shown on **Figure 2-16** and in greater detail in **Appendix D**, consists of an elevated rail viaduct with limited retaining walls within the existing BNSF right-of-way and a new BNSF-KCS interchange constructed south of the Pvt. John Allen National Fish Hatchery.

2.9.2.1 Rail Typical Sections

The proposed rail typical sections for this improvement, shown on **Figure 2-17** and in greater detail in the concept plans in **Appendix D**, were developed using BNSF standards. Typical sections were developed for the at-grade rail improvements, including the proposed storage tracks, elevated rail on fill with retaining wall, and bridge sections.

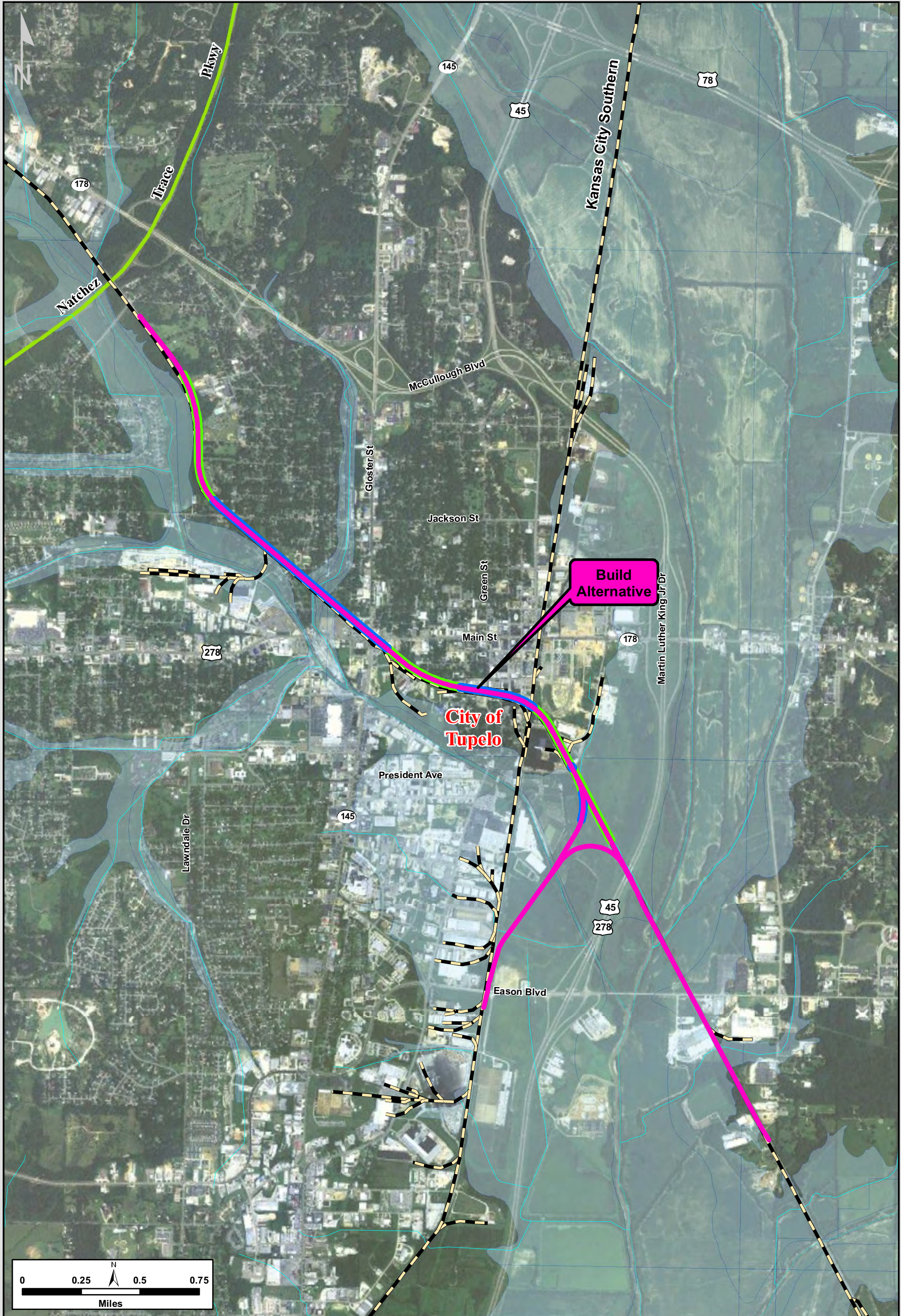
Based on consultations with BNSF, the entire main line between Memphis and Birmingham has been planned to become a double-track line, although those improvements are not included in BNSF's program for capital improvements and no other segments of the main line are double-tracked at this time. The typical sections for the elevated rail viaduct were developed to accommodate a future double-track of the BNSF main line through Tupelo, should BNSF expand the main line. However, because the double-track project would require significant improvements along the entire corridor between Memphis and Birmingham, not just through Tupelo, the double-track is not reasonably foreseeable. The proposed improvements only include a single rail line and the second track is not included as part of this project.









2.9.2.2 Rail Alignment

The horizontal and vertical alignment controls are much more stringent for trains than for roadways for several reasons. Railroads require gentler grades, wider turning radii, and larger transitional lengths than roadways due to the size and weight of trains. While FRA has developed design standards for railroads, each railroad has developed their own stringent horizontal and vertical controls to meet the specific needs of their train systems. The horizontal and vertical alignments for the Build Alternative, discussed here and detailed in the concept plans in **Appendix D**, were designed to meet or exceed BNSF design criteria.

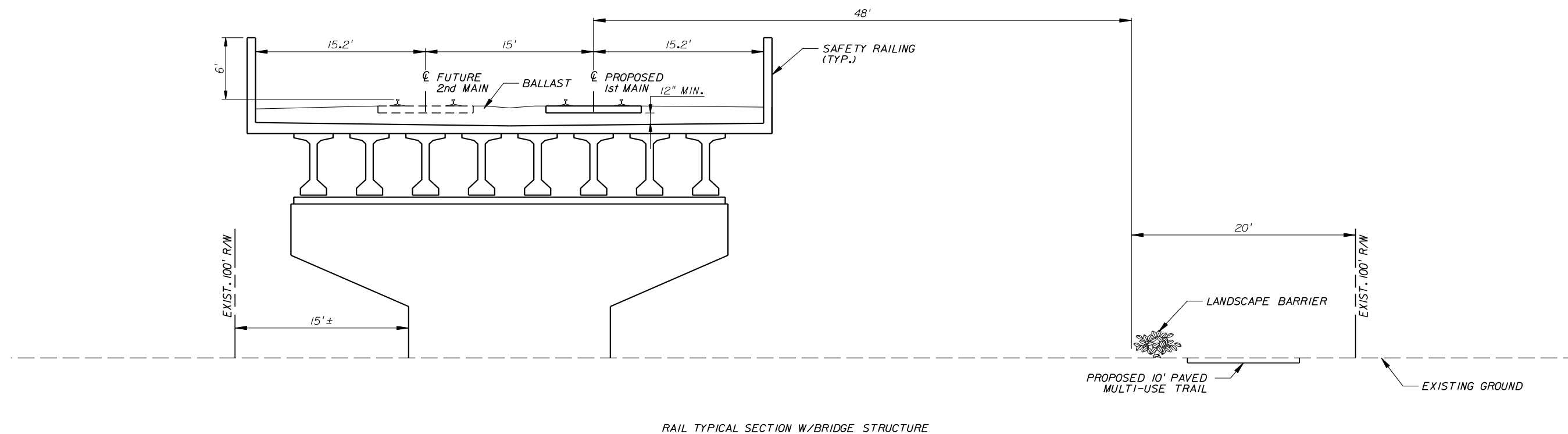
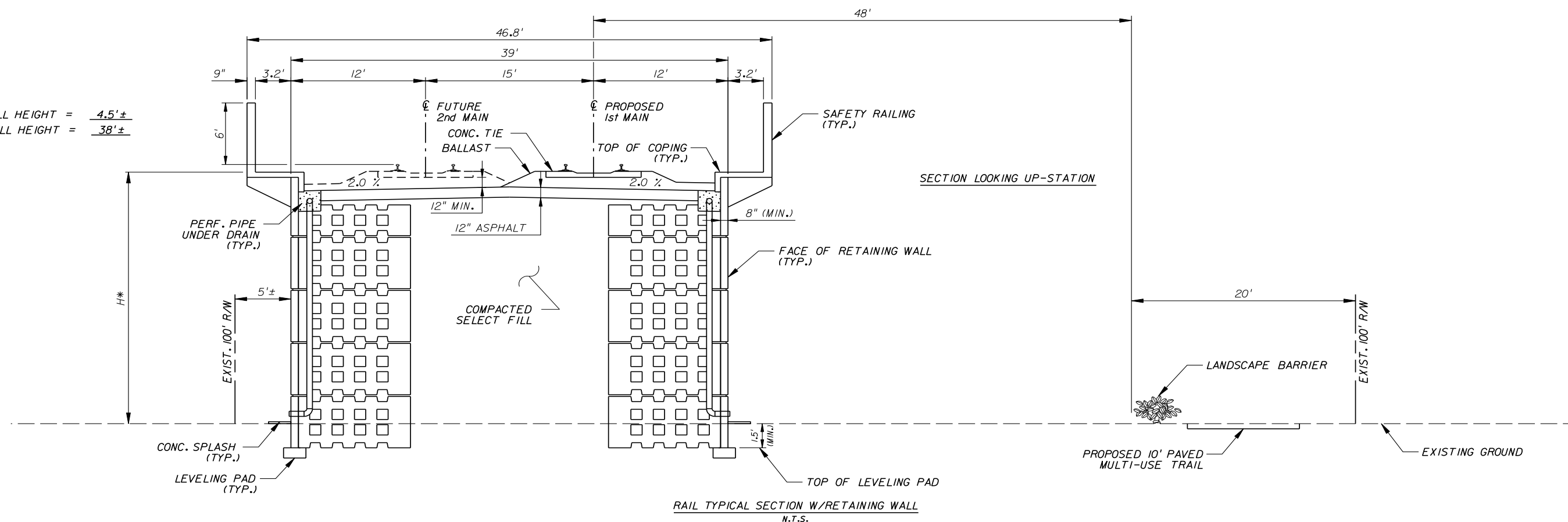
2.9.2.2.1 Horizontal Alignment

The proposed main line alignment would maintain the existing track from north of the Natchez Trace Parkway to just south of Lumpkin Avenue. The track would then run on a new horizontal alignment, which begins at BNSF station 30930+22.59, or BNSF MP 585.73, and ends at BNSF station 31115+17.40, or BNSF MP 589.40 just north of Town Creek, for a total distance of 18,495 feet, or approximately 3.5 miles. The BNSF main line would continue to the south on the existing track. The proposed interchange track would begin at BNSF station 31103+73.07 just north of the US 45 highway overpass, at



	 Build Alternative	 FEMA Floodplain	Tupelo Mississippi Railroad Relocation Planning & Environmental Study	Build Alternative
	 Bridge Structure	 Railroad		Figure 2-16
 Structure on Fill with Retaining Wall	 Natchez Trace Pkwy			
	 River / Stream			

* MIN. WALL HEIGHT = $4.5' \pm$
 * MAX. WALL HEIGHT = $38' \pm$



interchange station 1+00.00 and ends at interchange station 55+16.68, which is KCS station 14673+00.00, for a total distance of 5,417 feet, or 1.03 miles.

The proposed storage track along the BNSF main line would parallel the existing BNSF main line, offset 25 feet, from approximate BNSF station 31107+00 just south of the US 45 overpass to approximate BNSF station 31174+00 just south of Veterans Boulevard, with a second track, offset an additional 15 feet also included to approximate BNSF station 31143+00 just south of Eason Boulevard, for a total clear storage length of 8,300 feet. The storage tracks would be accessed using turnouts just south of the US 45 overpass and just south of the Veterans Boulevard crossing. The proposed storage tracks along the proposed interchange track would parallel the interchange track, offset 15 feet each, from approximate station 18+00 to approximate station 45+00, for a total clear storage length of 3,710 feet. The storage tracks would be accessed from turnouts along the interchange track. The interchange also includes a wye branching off from approximate station 22+00, just south of the proposed Kings Creek bridge, to allow northbound KCS trains access to the northbound BNSF main line. The wye would intersect the BNSF main line at BNSF station 31080+29.77 just south of Elizabeth Street.

Table 2-8 describes the proposed mainline and interchange track horizontal alignment, curves, and superelevation within the project limits.

Table 2-8 Proposed Horizontal Alignment BNSF Main Line and Interchange

Curve/PI	TS/PC Station	Back Tangent	PI Station	Ahead Tangent	ST/PT Station	Degree of Curvature	Curve Direction	Curve Radius [ft]	Curve Length [ft]	Spiral Lengths [ft]	Design Speed [mph]	Superelevation [in]
BNSF Main Line												
C15	30930+22.59	S 38° 09' 01" E	30931+57.59	S 39° 09' 01" E	30932+92.59	0° 30' 00.00"	Left	11,459.19	130.00	70	60	3/4
C16	30940+14.79	S 39° 09' 01" E	30951+09.00	S 1° 32' 38" E	30961+53.65	1° 57' 35.39"	Right	2,923.65	1,698.87	220	60	3 1/8
C17	30965+24.20	S 1° 32' 38" E	30972+42.68	S 50° 40' 36" E	30979+16.55	4° 07' 14.87"	Left	1,390.70	992.35	200	45	4
31016+37.82	-	S 50° 40' 36" E	-	S 50° 51' 50" E	-	-	Left	-	-	-	-	-
C18	31030+37.99	S 50° 51' 50" E	31038+36.19	S 81° 09' 25" E	31046+00.67	1° 59' 22.09"	Left	2,880.10	1,482.67	40	45	7/8
31050+82.87	-	S 81° 09' 25" E	-	S 80° 54' 27" E	-	-	Left	-	-	-	-	-
C19	31055+17.47	S 80° 54' 27" E	31062+86.99	S 29° 03' 41" E	31070+00.35	4° 02' 29.37"	Right	1,417.98	1,082.88	200	45	3 3/4
C20	31107+94.63	S 29° 03' 41" E	31109+37.83	S 26° 41' 51" E	31110+81.01	1° 00' 00.00"	Right	5,729.65	186.38	50	60	3/4
C21	31112+31.01	S 26° 41' 51" E	31113+74.21	S 29° 03' 41" E	31115+17.40	1° 00' 00.00"	Left	5,729.65	186.38	50	60	3/4
Interchange Track												
L-1	1+00.00	N 29° 03' 41" W	14+06.95	S 35° 05' 11" W	17+56.06	6° 59' 44.33"	Left	819.02	1,656.06	0	10	0
L-2	39+85.53	S 35° 05' 11" W	41+54.59	S 15° 01' 00" W	43+20.18	5° 59' 50.13"	Left	955.37	334.65	0	10	0
Wye Track												
W-1	3+09.54	S 25° 14' 35" E	9+74.27	S 29° 52' 53" W	15+34.84	4° 29' 55.84"	Right	1,273.57	1,225.30	0	10	0

2.9.2.2.2 Vertical Alignment

The proposed main line and interchange track vertical alignment is provided in **Table 2-9**. The vertical alignment of the storage track along the BNSF main line would match the existing BNSF alignment. The storage track along the proposed interchange track would match the profile of the interchange track.

Table 2-9 Proposed Vertical Alignment BNSF Main Line and Interchange

PVI Station	Crest/ Sag/ PI	Grade In [%]	Grade Out [%]	Proposed Vertical Curve Length [ft]	Proposed "K" Value
BNSF Main Line					
30939+96.64	S	-0.040	0.500	1,086	2,000
30971+06.76	C	0.500	0.000	500	1,000
30980+72.22	C	0.000	-0.281	280	1,000
30999+51.14	S	-0.281	0.200	960	2,000
31016+44.82	C	0.200	0.100	100	1,000
31059+04.98	C	0.100	-1.000	1100	1,000
31102+56.70	S	-1.000	0.000	800	800
Interchange Track					
1+00.00	PI	0.000	0.000	-	-
46+27.94	PI	0.000	0.000	-	-
Wye Track					
1+00.00	PI	-1.000	-1.000	-	-
23+27.00	S	-1.000	0.000	500	500
27+04.87	PI	0.000	0.000	-	-

2.9.2.3 Right-of-Way and Relocations

The majority of the main line railroad improvements are proposed within the existing BNSF right-of-way. An additional 10 feet of right-of-way would be required on the south side of the BNSF main line from US 45 to just south of Eason Boulevard to accommodate the proposed storage tracks. The interchange would require 100 feet (50 feet on each side of the centerline) of right-of-way from station 1+00.00 to station 20+00.00 and 130 feet of right of way (50 feet north of the centerline and 80 feet south of the centerline) from station 20+00.00 to station 50+00.00. The wye would require 100 feet of right-of-way (50 feet on each side of the centerline) from station 1+00.00 to station 27+04.87. This would leave an isolated triangle remainder between the wye and the interchange track of approximately 8.9 acres. However, this remainder consists of agricultural land and would retain access underneath the

wye bridge. Right-of-way acquisition is required only from vacant or agricultural parcels and would not affect any existing residential or business parcels.

As documented in the *Current Railroad Operations Technical Memorandum* (HDR, November 2005), there are three active rail customers within the Tupelo city limits on the BNSF main line: Summerville Ties, Flexible Foam Products, and Inter-Pac Incorporated. Of these customers, only Summerville Ties lies in an area of elevated rail and would require relocation. Summerville's operations at this site are on a leased property within the BNSF right-of-way, and only include loading. The ties are cut elsewhere and trucked to the site. There are limited facilities at the site and no physical plant; therefore, relocation of this customer would be feasible. Since the property was not owned by Summerville Ties, relocation costs were assumed to be limited to the construction of the rail spur at another location, and property acquisition costs were not included. The cost to construct a new rail spur was estimated to be approximately \$692,000, which includes the track cost and signal cost. At the time of this study, there were available industrial properties within the Tupelo city limits which included rail spurs on the BNSF main line. Relocation costs could be higher or lower than the estimated cost, based upon leasing or purchase agreements.

2.9.2.4 Structures

The BNSF main line would be constructed on approximately 8,220 linear feet of fill with retaining wall for the climb and descent between the at-grade and bridge sections, and through the industrial section of Tupelo, shown on **Figure 2-17** and the concept plans in **Appendix D**. Since the trains would put more live-load demand on the fill and retaining wall than would a typical roadway, a special retaining wall, called "T-wall," would be used to support the fill in these sections. The T-wall would include extra straps which extend into the fill from the exterior panels to increase the stability of the vertical wall.

Between Jackson Street and Elizabeth Street, the BNSF main line would be constructed on approximately 6,860 feet of bridge structure, shown on the concept plans and bridge typical sections in **Appendix D**. Pre-cast beam bridges would be constructed over much of the corridor, with through-plate girder bridges across the existing roadways. The bridge over the Crosstown intersection would span approximately 316 feet, requiring a truss structure. All of the bridge structures would provide at least 16 feet, 6 inches of vertical clearance above the existing roadways and 23 feet, 6 inches of vertical clearance over the KCS rail line.

The at-grade storage track along the BNSF main line would also require construction of approximately 1,100 feet of bridge structure over the floodway associated with Town Creek and Mud Creek. This would consist of a pre-cast

box beam bridge with through-plate girder bridges over each of the active streams.

The proposed interchange track would require construction of approximately 110 feet of pre-cast beam bridge structure to span the floodway associated with Kings Creek.

2.9.2.5 Drainage

The BNSF main line has 13 existing cross culverts and three existing bridge structures within the limits of the proposed improvements, shown in **Table 2-10**. Two bridge structures would remain for the BNSF main line over Mud Creek and Town Creek, one existing culvert would be removed, and 12 culverts would require extension as part of the proposed improvements, including the temporary rail required for maintenance of rail traffic described in **Section 2.9.2.8** and the pedestrian / bicycle trail as described in **Section 2.9.2.7**.

In addition to these culverts on the BNSF main line, the proposed interchange track would require one bridge structure to span the floodway associated with Kings Creek and four culverts, shown on the concept plans in **Appendix D**, to mitigate flow from existing ditches across the proposed rail alignment.

The stormwater effluent from the elevated viaduct would drain to the infield area between the structure and the pedestrian path. The runoff would be treated in a grassed swale area and discharged to adjacent streams. As there is little contamination from railroad effluent, this treatment would likely satisfy the National Pollutant Discharge Elimination System requirements of the EPA and MDOT.

2.9.2.6 Roadway Improvements

The proposed grade separations of the BNSF main line and roadway would affect several intersections within the City of Tupelo. For the at-grade intersections where the railroad would be elevated over the roadway, the existing signals, striping, and warning signs would need to be removed. Most of the existing at-grade intersections could be milled and resurfaced once the rail has been removed.

Almost all of the at-grade crossings have an increased vertical profile or “hump” where the existing rail crosses the roadway. Most of these humps are small (less than one foot in total profile elevation) and do not have a severe profile grade. Given the 30 mph speed limit, most of the crossings would not require profile reconstruction. Jackson Street is the only intersection that could benefit from some profile adjustment. The existing rail crossing is elevated approximately three feet compared with the roadway elevation at both Rankin Street to the west and Joyner Avenue to the east. However, there is also an existing concrete box culvert underneath the roadway/railroad

crossing that may limit the profile reduction. The profile grade at the Jackson Street crossing is not severe, and removal of the hump at this intersection would be at the discretion of the City of Tupelo.

The roadway improvements required include the replacement of the US 45 bridges over the BNSF main line, shown on the concept plans in **Appendix D**. The existing bridges were each constructed as 9-span bridges with a 50-foot center span and eight 40-foot ancillary spans. The existing vertical clearance over the BNSF main line is approximately 22 feet, 6 inches, which is one foot lower than the required vertical clearance prescribed by BNSF.

The proposed bridges would consist of four spans with a 109-foot center span over the existing BNSF main line, the proposed BNSF main line, a provision for a future track if the BNSF is to be double-tracked through Tupelo, a 112-foot northern ancillary span, and two 60-foot southern ancillary spans. The main span would provide the minimum 25-foot horizontal clear distance from the center of each of the tracks, including the provisional future track, so crash walls are not required for the proposed bridge piers. The replacement of these bridges would also require an increase in the vertical profile elevation to allow for the required vertical clearance and to accommodate the deeper bridge section. This would require the reconstruction of approximately 3,420 feet of US 45, which would begin just north of the bridges over Kings Creek, shown on the concept plans in **Appendix D**.

The roadway improvements required also include the construction of two overpasses on Eason Boulevard, one over the KCS rail line and one over the BNSF main line, shown on the concept plans in **Appendix D**. The overpasses also include frontage roads to the parcels adjacent to Eason Boulevard. The overpass over the BNSF main line includes the replacement of the existing 1,020-foot long, two-lane bridge over Kings Creek and Town Creek.

2.9.2.7 Pedestrian and Bicycle Facilities

The proposed improvements would require the removal of two footprints of at-grade track, the existing BNSF main line and the temporary maintenance of traffic rail line. After the removal of all existing at-grade track between Jackson Street and Spring Street, the southernmost 20 feet of BNSF right-of-way can be converted into a paved pedestrian/bicycle (multi-use) path through Tupelo, shown on **Figure 2-17** and detailed in the concept plans in **Appendix D**, extending south from Jackson Street and terminating at Spring Street. This 10-foot wide path would be paved and include stop signs at each roadway crossing and a special pedestrian signal for the Crosstown intersection.

Table 2-10 Drainage Structures on BNSF Main Line

BNSF MP	Structure Type	Number of Pipes	Length [ft]	Width/ Diameter [in]	Height [in]	Build Recommendation	MOT* Requirements
585.70	CMP	2	40	42	-	Extend ¹	Extend
585.87	CMP	2	30	24	-	Extend ¹	Extend
586.06	CMP	2	50	24	-	Extend	Extend
586.24	CMP	2	50	48	-	Extend	Extend
586.80	CBC	1	80	72	72	To Remain	Extend
586.85	CMP	1	32	60	-	To Remain ²	Extend
587.03	CBC	1	20	36	36	To Remain ²	Extend
587.20	Bridge	-	-	-	-	Construct Pedestrian Bridge	Construct Temporary Railroad Bridge
587.80	CBC	2	75	90	72	Extend	To Remain
588.31	VCP	1	68	18	-	Remove ³	To Remain
588.72	CMP	2	58	72	-	Extend	Extend
589.40	Bridge	-	-	-	-	To Remain	To Remain
589.50	Bridge	-	-	-	-	To Remain	To Remain
589.60	CMP	1	60	48	-	Extend ⁴	Extend ⁴
589.86	CBC	1	30	120	96	Extend ⁴	Extend ⁴
590.28	RCP	1	36	24	-	Extend ⁴	Extend ⁴

Notes:

- 1 - Culverts to be extended for the construction of the future double-track.
- 2 - Structure to remain for proposed pedestrian/bicycle path only.
- 3 - Culvert parallels existing track under a signal foundation, which will be removed as part of the proposed improvements.
- 4 - Culverts to be extended for proposed at-grade storage track.

*MOT - Maintenance of Traffic

In addition to the multi-use path, the two existing sidewalk segments that terminate at the BNSF right-of-way could be connected. The segments are each located along the west side of Park Street and Church Street. No other streets which include sidewalks cross the existing BNSF main line. However, with the grade-separation of the rail over the roadway, a sidewalk connection could be installed along the roadway within the BNSF right-of-way.

2.9.2.8 Construction

In order to facilitate the construction of the Build Alternative, the construction process was divided into three phases. The construction phasing allows for both partial construction of the project and the uninterrupted flow of rail traffic through Tupelo during the entire construction process.

2.9.2.8.1 Phase I

The first phase of the construction would involve the construction of the BNSF-KCS interchange, the at-grade storage track along the BNSF main line, and the roadway improvements to Eason Boulevard. This first construction phase can be broken down into three sub-phases to create smaller projects that can be built as funding becomes available.

Phase IA

The first sub-phase, Phase IA, would be to construct the Eason Boulevard overpass over the KCS rail line. The overpass would have to accommodate the u-turn for the frontage road and the future interchange track to be constructed in a subsequent sub-phase.

Phase IB

The second sub-phase, Phase IB, would be to construct the Eason Boulevard overpass over the BNSF main line and Ryder Street and to reconstruct the Eason Boulevard bridge over Town Creek and Kings Creek. The overpass would have to accommodate the u-turns for the frontage roads and the future storage track to be constructed in a subsequent sub-phase.

Phase IC

The final sub-phase, Phase IC, would be to construct the railroad interchange track and storage tracks for the relocated railroad interchange.

These improvements would be constructed with little interruption of the BNSF operations as the construction would be offset a minimum of 25 feet from the existing BNSF main line. Three existing cross culverts would require extension to cross underneath the proposed storage track along the BNSF main line, shown in **Table 2-10**. The traffic on Eason Boulevard would be maintained on temporary at-

grade crossings for both the BNSF and KCS while the overpasses in Phase IA and Phase IB are being constructed. Upon completion of Phase IC, the new interchange would replace the operations of the old interchange and the interchange operation would no longer affect the Crosstown intersection. The construction of the wye would not be included in Phase IC, as it would interfere with the construction of the temporary track in Phase II. To maintain KCS track rights to the northbound BNSF main line, the existing interchange track would remain.

2.9.2.8.2 Phase II

Phase II would involve the construction of the temporary main line track, shown on **Figure 2-18** and on the maintenance of traffic (MOT) plans in **Appendix D**. Unlike temporary roadways, temporary rail is only termed temporary because it would be removed when the permanent improvements are completed. The temporary rail must be constructed using the same sub-grade, sub-ballast, ballast, tie, and rail standards as a permanent railroad. This temporary main line track would begin north of the Lumpkin Avenue crossing and be offset approximately 19 feet from the existing BNSF main line and continue south to just north of the relocated BNSF-KCS interchange from Phase IC. This second construction phase can be broken down into two sub-phases to create smaller projects that can be built as funding becomes available.

Phase IIA

The first sub-phase, Phase IIA, would be to construct the temporary main line track between Crosstown and the relocated BNSF-KCS interchange. This sub-phase would include a new at-grade crossing of the KCS rail line with a temporary diamond. This new at-grade alignment would include a larger horizontal curve radius, which would allow trains to move faster through Tupelo. Phase IIA would also require modified at-grade crossings at Church Street, Green Street, Spring Street, and Elizabeth Street, the removal of the existing BNSF-KCS interchange track between Crosstown and Spring Street and the relocation of the switch left in place from Phase IC from just south of Crosstown to some point between Spring Street and Green Street. This switch would be required to maintain KCS track rights to the northbound BNSF main line.

Phase IIB

The second sub-phase, Phase IIB, would be to construct the remainder of the temporary main line track from just north of Lumpkin Avenue to join the track built in Phase IIA just south of Crosstown. Included in this temporary main line would be a bridge across the Kings Creek tributary between Blair Street and Jefferson Street, modified at-grade crossings at Lumpkin Avenue, Jackson Street, Blair Street, Jefferson Street, Park Street, and Crosstown.

All of the modified at-grade crossings in Phase IIA and Phase IIB would require the installation of new railroad signals. Most of these at-grade crossings would require some roadway profile adjustment, which can be achieved with asphalt overbuild. In addition, the temporary track in Phase IIA and Phase IIB would require the extension of eight cross culverts, shown on the MOT plans in **Appendix D** and in **Table 2-10**. The existing BNSF-KCS interchange track would be moved to tie-in to the temporary rail alignment to maintain the KCS track rights to the northbound BNSF main line.

Once Phase IIB is completed and the entire temporary track is in place, the existing main line track, storage track, and spur tracks would be removed between the beginning of the proposed main line track just south of Lumpkin Avenue and the end of the temporary track just north of the proposed interchange track north of the US 45 overpass.

Once Phase IIA is completed, funding for Phase III should be identified prior to commencement of Phase IIB. Construction of Phase IIB should only be done immediately prior to Phase III, as the realignment needed for Phase IIB moves the railroad closer to several residences. This realignment would produce additional noise and vibration impacts to these residences and, therefore, should be as short in duration as is feasible. In addition, the realignment in Phase IIB would require construction of a temporary bridge and impact a wetland area, which requires additional mitigation cost.

2.9.2.8.3 Phase III

Upon completion of Phase IIB, the construction of the wye track at the relocated interchange and the elevated rail viaduct between Lumpkin Avenue and US 45 would begin. This phase would include the construction of the proposed BNSF main line, including the retaining wall and bridge structures, and the reconstruction of the US 45 overpasses to accommodate the proposed track. The traffic on US 45 would be reduced to one lane in each direction across one of the bridges while the other bridge is removed and reconstructed. Once completed, the traffic would then be diverted to the new bridge while

the remaining bridge is likewise removed and reconstructed. Once the US 45 overpasses are reconstructed, the elevated viaduct would be connected to the existing BNSF main line at the bridge just north of Town Creek.

During Phase III, construction of the truss bridge across the Crosstown intersection would have significant impacts to the roadway traffic on both Main Street and Gloster Street. This bridge spans approximately 316 feet and would require, at a minimum, the off-peak closure of certain movements in addition to lane reductions across this intersection during its erection. While traffic could be diverted onto any number of local streets, most are only two-lane roads and would quickly reach capacity. Advance signing should be used to detour traffic around this intersection onto major roadways (i.e. Cliff Gookin Boulevard/Eason Boulevard for east/west travel and US 45 for north/south travel). Construction of the US 45 overpass replacement should not coincide with the construction of the bridge over the Crosstown intersection.

Upon completion of the elevated viaduct, the BNSF main line would run in its proposed alignment on the elevated viaduct. The temporary track would be removed, including all of the modified at-grade railroad crossings and temporary bridges. The grade-separated roadways would be milled and resurfaced and the rail crossing signs, signals, and striping would be removed. The multi-use path could then be constructed along the southwestern-most portion of the BNSF right-of-way.

2.9.2.9 Railroad Operations

Once the proposed improvements are constructed, trains on the BNSF main line could run at 40 mph through Tupelo, without having to sound their horns for at-grade crossings between Lumpkin Avenue (BNSF MP 585.71) and Veterans Boulevard (MP 590.32), for a distance of almost five miles. In addition, the rail interchange operations between the KCS and BNSF can occur without disruption to roadway traffic and with an increased storage area. All of the existing rail customers on the KCS rail line could continue their service uninterrupted. One existing rail customer, the Summerville Ties loading operation as discussed in **Section 2.9.2.3**, on the BNSF main line would require relocation while the other customers on the BNSF main line could continue their service uninterrupted. In addition, the proposed improvements would not inhibit the ability of BNSF to increase capacity at some point in the future with the addition of a second main line track on their railway through Tupelo. As discussed in **Section 2.9.2.1**, this second track is not a reasonably foreseeable project as significant improvements would be needed outside of Tupelo as well and is not currently programmed.

2.9.2.10 Project Costs

Preliminary construction cost estimates were prepared for the railroad physical plant, roadway, and multi-use path improvements. These preliminary cost estimates included specific design elements and were more detailed than the costs developed during the alternatives analysis process. The cost estimates are separated into three categories, one for each major construction phase. Each phase has railroad and roadway items associated with the corresponding phase. The quantities for certain items were estimated based on quantities generated from the concept plans.

The subcategories for the railroad category are trackwork, site work, signals, bridge structures, and mobilization. The trackwork subcategory includes items such as track construction, turnouts, and crossings. The site work subcategory includes such items as clearing and grubbing, grading, and drainage culvert extensions. The signals subcategory includes crossing signals and wayside signals associated with the railroad. The bridge structures subcategory includes all of the railroad bridge structures for that individual phase. The mobilization category only includes the mobilization cost for the railroad improvements.

The subcategories for the roadway category are more phase-specific to each roadway improvement. For Phase I and Phase III, the Eason Boulevard and US 45 subcategories, respectively, include all of the more typical roadway costs, including pavement, embankment, striping, curb, guardrail, and sod. For Phase II, the asphalt overbuild subcategory includes the pavement overbuild anticipated for each of the 11 at-grade crossings within the City of Tupelo. The bridge structure costs are estimated for each bridge and for each phase of the construction. The retaining wall costs in Phase I include only the precast concrete walls along Eason Boulevard. The mobilization costs are phase-dependent, ranging from 10% to 20% of the roadway and bridge construction costs. The maintenance of traffic costs are also phase-dependent and include roadway maintenance of traffic inclusive of the railroad improvements for each phase.

A contingency was added with a lump sum value of 20% of the railroad and roadway subtotals. The engineering cost was added with a lump sum value of 15% of the railroad and roadway subtotals and includes costs for preliminary engineering, final engineering, survey, geotechnical survey, and right-of-way mapping.

While the Build Alternative uses existing right-of-way in most locations, right-of-way acquisition would be necessary to implement the proposed improvements, including the relocated BNSF-KCS interchange and the roadway improvements along Eason Boulevard. Using available GIS parcel data, an average assessed value was determined for developed and undeveloped parcels. The developed parcels had an average assessed value of



approximately \$170,000 per acre, while the undeveloped parcels had an average assessed value per acre of approximately \$100,000. The estimated cost of land acquisition is more than the assessed value of the land and physical improvements. Other expenses may occur during acquisition, including eminent domain proceedings, attorney fees, business damages, and relocations. The assessed value per acre was multiplied by three to conservatively account for these items, which reflects historical trends for property acquisition. This would have a value in the developed and undeveloped parcels of approximately \$510,000 and \$300,000 per acre, respectively.

The project construction costs were segregated by construction phase, shown in **Table 2-11**, and were estimated to sum to approximately \$385 million for the entire Build Alternative.

Maintenance costs were estimated for the project for both the relocated interchange yard (Phase I) and the elevated viaduct (Phase III), shown in **Appendix C**. The maintenance costs for the temporary rail (Phase II) were not estimated as the design life of the temporary rail would exceed the timeframe that the rail would actually be used. The maintenance costs include such items as tie replacement, rail reconditioning, structure maintenance, repainting and other typical maintenance items.

The estimated annual maintenance costs for the relocated interchange yard (Phase I) are approximately \$33,000. The estimated annual maintenance costs for the elevated viaduct (Phase III) are \$318,000.

Funding for the project has not been identified at this point in the study. Funding for the design, right-of-way acquisition, and construction of the project would need to be secured from some combination of federal, state, local, or private funding sources. A more detailed discussion on potential funding sources is provided in **Chapter 6** of this report.

Table 2-11 Project Construction Costs

Phase I - Interchange Construction	
Cost Component	Cost
Railroad Construction	
Trackwork	\$3,555,000
Site Work	\$3,396,000
Signals	\$1,715,000
Bridge Structures	\$10,164,000
Mobilization	\$942,000
Railroad Subtotal	\$19,772,000
Roadway Construction	
Eason Boulevard	\$4,038,000
Bridge Structure over KCS	\$1,468,000
Bridge Structure over BNSF	\$16,293,000
Retaining Walls	\$3,268,000
Mobilization	\$2,507,000
Maintenance of Traffic	\$5,014,000
Roadway Subtotal	\$32,588,000
Construction Subtotal	\$52,360,000
Contingency (20%)	\$10,472,000
Engineering (15%)	\$7,854,000
Railroad Right-of-Way	\$3,510,000
Roadway Right-of-Way	\$1,479,000
Phase I Total	\$75,675,000

Phase II - Temporary Track Construction	
Cost Component	Cost
Railroad Construction	
Trackwork	\$4,017,000
Site Work	\$2,430,000
Signals	\$650,000
Bridge Structures	\$169,000
Mobilization	\$582,000
Railroad Subtotal	\$7,848,000
Roadway Construction	
Asphalt Overbuild @ Crossings	\$60,000
Mobilization	\$12,000
Maintenance of Traffic	\$700,000
Roadway Subtotal	\$772,000
Construction Subtotal	\$8,620,000
Contingency (20%)	\$1,724,000
Engineering (15%)	\$1,293,000
Railroad Right-of-Way	\$0
Roadway Right-of-Way	\$0
Phase II Total	\$11,637,000

Phase III - Elevated Rail Viaduct Construction	
Cost Component	Cost
Railroad Construction	
Trackwork	\$3,896,000
Site Work	\$54,311,000
Signals	\$618,000
Bridge Structures	\$141,555,000
Mobilization	\$10,019,000
Railroad Subtotal	\$210,399,000
Roadway Construction	
US 45	\$1,715,000
Bridge Structures over BNSF	\$3,465,000
Sidewalk Connections	\$4,000
Multi-Use Path	\$791,000
Mobilization	\$519,000
Maintenance of Traffic	\$1,737,000
Roadway Subtotal	\$8,231,000
Construction Subtotal	\$218,630,000
Contingency (20%)	\$43,726,000
Engineering (15%)	\$32,795,000
Railroad Right-of-Way*	\$2,282,000
Roadway Right-of-Way	\$0
Phase III Total	\$297,433,000

Total Construction Cost All Phases	\$384,745,000
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Notes:

Costs in 2008 Dollars, estimated by HDR based on similar projects in Southeastern U.S. and unit costs available from Get-A-Quote.net (2008 Mississippi Costs)

*Railroad Right-of-Way Costs for Phase III include relocation costs for Summerville Ties